Redes Neuronales - TP2

Ej 4

- a - Implemente una red con aprendizaje Backpropagation que aprenda la siguiente función:

$$f(x, y, z) = sin(x) + cos(y) + z$$

donde: x e y ∈ [0,2 π] y z ∈[−1,1]. Para ello construya un conjunto de datos de entrenamiento y un conjunto de evaluación. Muestre la evolución del error e entrenamiento y de evaluación en función de las épocas de entrenamiento.

- b - Estudie la evolución de los errores durante el entrenamiento de una red con una capa oculta de 30 neuronas cuando el conjunto de entrenamiento contiene 40 muestras. ¿Que ocurre si el minibatch tiene tamaño 40? ¿Y si tiene tamaño 1?

Acá la consigna lo lo explicita pero hay que aplicar algo de minibatch al lagoritmo de aprendizaje.

Robando de un post de stackExchange:

batch gradient descent you process the entire training set in one iteration. Whereas, in a mini-batch gradient descent you process a small subset of the training set in each iteration.

Also compare stochastic gradient descent, where you process a single example from the training set in each iteration.

Another way to look at it: they are all examples of the same approach to gradient descent with a batch size of m and a training set of size n. For stochastic gradient descent, m=1. For batch gradient descent, m = n. For mini-batch, m=b and b < n, typically b is small compared to n.

Mini-batch adds the question of determining the right size for b, but finding the right b may greatly improve your results.

Dicho todo esto, la idea es tomar el set de datos y generar batches de entrenamiento. Es otro loop for y una partición de los datos de entrada. hay 2 hiperparams -> la # de minibatches y la # de veces que hacemos el proceso. Para mantener la cantidad de muestras balanceadas, solo se le pueden mostrar 1 vez por batch de minibatch

```python
In [1]: import numpy as np
        import matplotlib.pyplot as plt
        from sklearn.model_selection import train_test_split
```

Vamos a generar las muestras de la función. Voy a barrer X, Y de 0 a 2pi para Z=+-1

```python
In [2]: x = np.linspace(0,1,num=200)*2*np.pi
        y = x # hasta ahora tenemos los ejes
        z = [-1,1]
        f = []
        tripletas_xyz = []

        for k in z:
            for i in x:
                for j in y:
                    tripletas_xyz.append([i,j,k])


        # este es el dataset entero, es gigante.

        # -> lo pasamos a matriz
```

```
dataset = np.asmatrix(tripletas_xyz) # listo.

# no lo shuffleo acá, es lo va a hacer el entrenador
# voy a generar el f

f = np.sin(dataset[:,0])+np.cos(dataset[:,1])+dataset[:,2]
```

Ahora toca shufflear las filas y hacer dataset de entrenamiento y de testeo. Por comodidad lo hago con sklearn, el resto si será a mano. Como tengo 80mil registros, y quiero batches de números enteros, voy a separar esto en una proporción 70% 30%, que me parece razonable. Luego, los minibatches serán de números como 1,10,100,1000,2000,4000.

In [3]:
```python
X_train, X_test, y_train, y_test = train_test_split(  dataset, f, train_size = 56000, random_state=0)
```

In [4]:
```python
class perceptron_multicapa:
    def __init__(self, capas, dim_entrada):
        self.capas = capas
        self.dim_entrada = dim_entrada
        self.lista_matrices = []
        self.lr = None
        entrada_anterior = dim_entrada
        for num_perceptrones in capas:
            matriz_pesos = np.random.uniform(-2, 2, size=(num_perceptrones, entrada_anterior + 1)) # inicialización más amplia
            self.lista_matrices.append(matriz_pesos)
            entrada_anterior = num_perceptrones

    def funcion_activacion(self, x):
        return 1 / (1 + np.exp(-x))

    def derivada_activacion(self, a):
        return a * (1 - a)

    def forward(self, x):
        a = x
        activaciones = [a] # todos los x de la red cuando se propaga para adelante - es el zs pasado por la función de activación
        zs = []# todos los h de la red cuando se propaga para adelante
        for W in self.lista_matrices:
            a_b = np.concatenate(([1], a))
            z = np.dot(W, a_b)
            zs.append(z)
            a = self.funcion_activacion(z)
            activaciones.append(a)
        return activaciones, zs

    def predecir(self, X):
        salidas = []
        for x in X:
            a = x
            for W in self.lista_matrices:
                a = np.concatenate(([1], a))
                a = self.funcion_activacion(np.dot(W, a))
            salidas.append(a.reshape(-1))  # garantiza que sea vector 1D
        return np.array(salidas).reshape(len(X), -1)

    def predecir_hard(self, X):
        salidas = self.predecir(X)
        # Si la salida es entre 0 y 1 (sigmoide), umbral en 0.5
        return (salidas >= 0.5).astype(int)

    def entrenar(self, X, Y, lr=1.0, epochs=100):
        self.lr = lr
```

```python
            n_samples = X.shape[0]
        self.error_por_epoch = []
        for epoch in range(epochs):
            grad_acum = [np.zeros_like(W) for W in self.lista_matrices]
            for i in range(n_samples):
                x = X[i]
                y = Y[i]
                activaciones, zs = self.forward(x) # tomo los h y x del paso foward
                deltas = [None] * len(self.lista_matrices) # lugar para guardar los deltas
                a_out = activaciones[-1] # la activaión de la salida es la última
                deltas[-1] = (a_out - y) * self.derivada_activacion(a_out) # el último delta es el de la salida, y se calcula como la salida deseada - la actual por la derivada de la func de
                for l in range(len(self.lista_matrices)-2, -1, -1): # acá propagamos desde la salida para aras
                    W_next = self.lista_matrices[l+1][:,1:]
                    delta_next = deltas[l+1]
                    a_l = activaciones[l+1]
                    deltas[l] = np.dot(W_next.T, delta_next) * self.derivada_activacion(a_l)
                for l in range(len(self.lista_matrices)):
                    a_prev = np.concatenate(([1], activaciones[l]))
                    grad_acum[l] += np.outer(deltas[l], a_prev)
            for l in range(len(self.lista_matrices)):
                self.lista_matrices[l] -= self.lr * grad_acum[l] / n_samples
            if epoch % 100 == 0 or epoch == epochs-1:
                pred = self.predecir(X)
                loss = np.mean((pred - Y) ** 2) # acá se va guardando el ECM para luego visualizarlo, pero se hace cada tanto, no los miles de puntos.
                self.error_por_epoch.append(loss)

    def minibatch_training(self, X, Y, tamanio, veces, lr=0.1, epochs=100, X_val=None, Y_val=None, eval_every=1, verbose=False):
        """
        Minibatch training wrapper.
        - X, Y: training data (ndarray)
        - tamanio: tamaño del minibatch (int)
        - veces: número de pasadas (epochs sobre el dataset, int)
        - lr, epochs: parámetros pasados a `entrenar` para cada minibatch
        - X_val, Y_val: si se pasan, se calcula ECM sobre validación cada `eval_every` batches
        - eval_every: frecuencia en batches para evaluar en validación (>=1)
        - verbose: si True imprime progreso resumido
        """
        # asegurar arrays numpy en caso de recibir matrices
        X = np.asarray(X)
        Y = np.asarray(Y)
        if X_val is not None and Y_val is not None:
            X_val = np.asarray(X_val)
            Y_val = np.asarray(Y_val)

        n_samples = X.shape[0]
        self.train_error_progress = []
        self.val_error_progress = []
        total_batches_per_pass = int(np.ceil(n_samples / float(tamanio)))
        for pass_idx in range(veces): # iteramos todas las veces pedidas
            indices = np.random.permutation(n_samples) # hacemos la permutacion para obtener indices randomizados
            X_shuffled = X[indices] # hacemos shuffling
            Y_shuffled = Y[indices]
            for b_idx, start in enumerate(range(0, n_samples, tamanio)):# toma de a batches de "tamanio"
                end = min(start + tamanio, n_samples)
                X_batch = X_shuffled[start:end]
                Y_batch = Y_shuffled[start:end]
                # Entrenar sobre este minibatch (actualiza pesos acumulativamente)
                self.entrenar(X_batch, Y_batch, lr=lr, epochs=epochs)
                # Calcular ECM sobre el minibatch (rápido) y guardar progreso
                pred_batch = self.predecir(X_batch)
```

```python
                    batch_loss = float(np.mean((pred_batch - Y_batch) ** 2))
                    self.train_error_progress.append(batch_loss)
                    # Evaluación en conjunto de validación si fue provisto y corresponde por frecuencia
                    if X_val is not None and Y_val is not None and ((b_idx % eval_every) == 0):
                        pred_val = self.predecir(X_val)
                        val_loss = float(np.mean((pred_val - Y_val) ** 2))
                        self.val_error_progress.append(val_loss)
                    # Mensaje resumido de progreso
                    if verbose and (b_idx % max(1, total_batches_per_pass//10) == 0):
                        msg = f"pass {pass_idx+1}/{veces} batch {b_idx+1}/{total_batches_per_pass} train_loss={batch_loss:.6f}"
                        if X_val is not None and Y_val is not None and ((b_idx % eval_every) == 0):
                            msg += f" val_loss={val_loss:.6f}"
                        print(msg)
            # devolver los historiales por conveniencia
            return {'train': self.train_error_progress, 'val': self.val_error_progress}
```

```python
In [5]:  # --- Entrenamiento para la función f(x,y,z) usando X_train / y_train ---
         # Convertir a ndarray y asegurar formas correctas (X: n x 3, y: n x 1)
         X_train_arr = np.asarray(X_train, dtype=float)
         y_train_arr = np.asarray(y_train, dtype=float).reshape(-1, 1)
         X_test_arr = np.asarray(X_test, dtype=float)
         y_test_arr = np.asarray(y_test, dtype=float).reshape(-1, 1)

         print('X_train shape =', X_train_arr.shape, 'y_train shape =', y_train_arr.shape)
         print('X_test shape =', X_test_arr.shape, 'y_test shape =', y_test_arr.shape)

         # hay que ajustar la salida para que esté entre 0 y 1, no -3 y 3
         y_train_arr = (y_train_arr + 3) / 6
         y_test_arr = (y_test_arr + 3) / 6

         # Crear un modelo para 3 entradas (ejemplo: 30 neuronas ocultas)
         model_f = perceptron_multicapa(capas=[30, 1], dim_entrada=3)

         # Entrenamiento con minibatches: tamanio de batch = 40 (configurable)
         # Pasamos X_test/y_test para evaluar progreso en validación, verbose para ver avance resumido
         hist = model_f.minibatch_training(X_train_arr, y_train_arr, tamanio=40, veces=10, lr=0.5, epochs=1, X_val=X_test_arr, Y_val=y_test_arr, eval_every=100, verbose=True)

         print('Entrenamiento de model_f completado.')
         print('Últimos 5 train losses:', hist['train'][-5:])
         print('Últimos 5 val losses:', hist['val'][-5:])

         # Graficar progreso (train y validation)
         plt.figure(figsize=(8,4))
         x_train = np.arange(len(hist['train']))
         # mapear val a indices aproximados a lo largo del eje de train para visual comparativa
         if len(hist['val'])>0:
             x_val = np.linspace(0, len(hist['train'])-1, len(hist['val']))
             plt.plot(x_train, hist['train'], label='train (minibatch ECM)')
             plt.plot(x_val, hist['val'], label='val (ECM)')
         else:
             plt.plot(x_train, hist['train'], label='train (minibatch ECM)')
         plt.xlabel('Batch index')
         plt.ylabel('ECM')
         plt.title('Progreso de ECM durante minibatch training (train vs val)')
         plt.legend()
         plt.grid(True)
         plt.show()
```
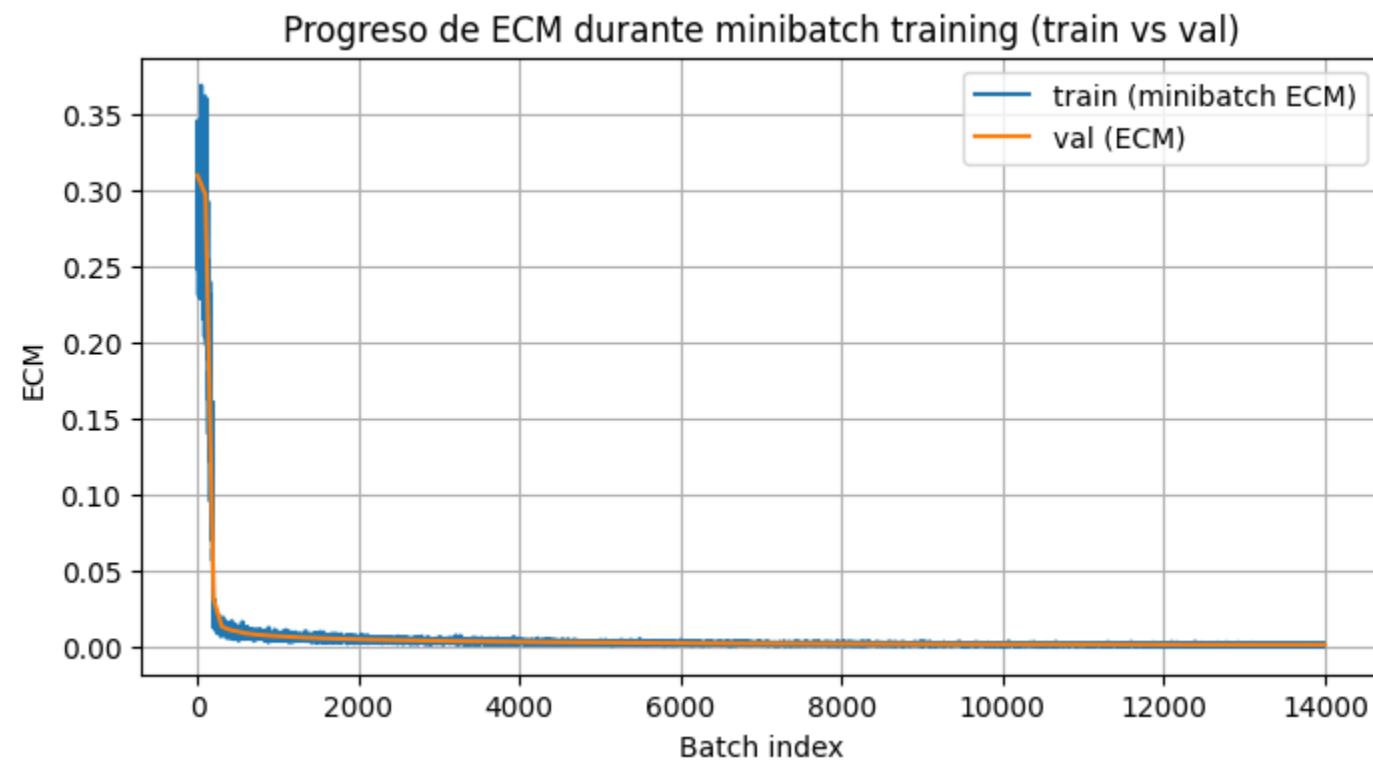
```
X_train shape = (56000, 3) y_train shape = (56000, 1)
X_test shape = (24000, 3) y_test shape = (24000, 1)
pass 1/10 batch 1/1400 train_loss=0.332727 val_loss=0.309758
pass 1/10 batch 141/1400 train_loss=0.212909
pass 1/10 batch 281/1400 train_loss=0.015151
pass 1/10 batch 421/1400 train_loss=0.009715
pass 1/10 batch 561/1400 train_loss=0.010719
pass 1/10 batch 701/1400 train_loss=0.009684 val_loss=0.008384
pass 1/10 batch 841/1400 train_loss=0.008119
pass 1/10 batch 981/1400 train_loss=0.007784
pass 1/10 batch 1121/1400 train_loss=0.007090
pass 1/10 batch 1261/1400 train_loss=0.007408
pass 2/10 batch 1/1400 train_loss=0.005614 val_loss=0.006148
pass 2/10 batch 141/1400 train_loss=0.003592
pass 2/10 batch 281/1400 train_loss=0.004242
pass 2/10 batch 421/1400 train_loss=0.004341
pass 2/10 batch 561/1400 train_loss=0.005790
pass 2/10 batch 701/1400 train_loss=0.003870 val_loss=0.004946
pass 2/10 batch 841/1400 train_loss=0.002841
pass 2/10 batch 981/1400 train_loss=0.003126
pass 2/10 batch 1121/1400 train_loss=0.004244
pass 2/10 batch 1261/1400 train_loss=0.004643
pass 3/10 batch 1/1400 train_loss=0.002855 val_loss=0.004245
pass 3/10 batch 141/1400 train_loss=0.003516
pass 3/10 batch 281/1400 train_loss=0.004632
pass 3/10 batch 421/1400 train_loss=0.003715
pass 3/10 batch 561/1400 train_loss=0.003902
pass 3/10 batch 701/1400 train_loss=0.003942 val_loss=0.003705
pass 3/10 batch 841/1400 train_loss=0.002245
pass 3/10 batch 981/1400 train_loss=0.003653
pass 3/10 batch 1121/1400 train_loss=0.006186
pass 3/10 batch 1261/1400 train_loss=0.003441
pass 4/10 batch 1/1400 train_loss=0.003552 val_loss=0.003339
pass 4/10 batch 141/1400 train_loss=0.003228
pass 4/10 batch 281/1400 train_loss=0.001786
pass 4/10 batch 421/1400 train_loss=0.002751
pass 4/10 batch 561/1400 train_loss=0.001896
pass 4/10 batch 701/1400 train_loss=0.003257 val_loss=0.002979
pass 4/10 batch 841/1400 train_loss=0.003447
pass 4/10 batch 981/1400 train_loss=0.002609
pass 4/10 batch 1121/1400 train_loss=0.002721
pass 4/10 batch 1261/1400 train_loss=0.003243
pass 5/10 batch 1/1400 train_loss=0.003322 val_loss=0.002678
pass 5/10 batch 141/1400 train_loss=0.002306
pass 5/10 batch 281/1400 train_loss=0.001860
pass 5/10 batch 421/1400 train_loss=0.002351
pass 5/10 batch 561/1400 train_loss=0.002639
pass 5/10 batch 701/1400 train_loss=0.002226 val_loss=0.002459
pass 5/10 batch 841/1400 train_loss=0.002445
pass 5/10 batch 981/1400 train_loss=0.001606
pass 5/10 batch 1121/1400 train_loss=0.001657
pass 5/10 batch 1261/1400 train_loss=0.002068
pass 6/10 batch 1/1400 train_loss=0.002111 val_loss=0.002313
pass 6/10 batch 141/1400 train_loss=0.002104
pass 6/10 batch 281/1400 train_loss=0.002460
pass 6/10 batch 421/1400 train_loss=0.002232
pass 6/10 batch 561/1400 train_loss=0.001896
pass 6/10 batch 701/1400 train_loss=0.002121 val_loss=0.002156
pass 6/10 batch 841/1400 train_loss=0.001901
pass 6/10 batch 981/1400 train_loss=0.001738
```

```
pass 6/10 batch 1121/1400 train_loss=0.001945
pass 6/10 batch 1261/1400 train_loss=0.001541
pass 7/10 batch 1/1400 train_loss=0.001825 val_loss=0.002046
pass 7/10 batch 141/1400 train_loss=0.001246
pass 7/10 batch 281/1400 train_loss=0.001302
pass 7/10 batch 421/1400 train_loss=0.001628
pass 7/10 batch 561/1400 train_loss=0.002345
pass 7/10 batch 701/1400 train_loss=0.001080 val_loss=0.001950
pass 7/10 batch 841/1400 train_loss=0.002139
pass 7/10 batch 981/1400 train_loss=0.001302
pass 7/10 batch 1121/1400 train_loss=0.001695
pass 7/10 batch 1261/1400 train_loss=0.001681
pass 8/10 batch 1/1400 train_loss=0.001291 val_loss=0.001872
pass 8/10 batch 141/1400 train_loss=0.001306
pass 8/10 batch 281/1400 train_loss=0.000817
pass 8/10 batch 421/1400 train_loss=0.001168
pass 8/10 batch 561/1400 train_loss=0.001048
pass 8/10 batch 701/1400 train_loss=0.002320 val_loss=0.001802
pass 8/10 batch 841/1400 train_loss=0.001082
pass 8/10 batch 981/1400 train_loss=0.001378
pass 8/10 batch 1121/1400 train_loss=0.001016
pass 8/10 batch 1261/1400 train_loss=0.001059
pass 9/10 batch 1/1400 train_loss=0.001979 val_loss=0.001751
pass 9/10 batch 141/1400 train_loss=0.001170
pass 9/10 batch 281/1400 train_loss=0.001891
pass 9/10 batch 421/1400 train_loss=0.001174
pass 9/10 batch 561/1400 train_loss=0.001119
pass 9/10 batch 701/1400 train_loss=0.001299 val_loss=0.001673
pass 9/10 batch 841/1400 train_loss=0.001660
pass 9/10 batch 981/1400 train_loss=0.002606
pass 9/10 batch 1121/1400 train_loss=0.002198
pass 9/10 batch 1261/1400 train_loss=0.002130
pass 10/10 batch 1/1400 train_loss=0.001249 val_loss=0.001626
pass 10/10 batch 141/1400 train_loss=0.001570
pass 10/10 batch 281/1400 train_loss=0.001638
pass 10/10 batch 421/1400 train_loss=0.001992
pass 10/10 batch 561/1400 train_loss=0.002131
pass 10/10 batch 701/1400 train_loss=0.001656 val_loss=0.001581
pass 10/10 batch 841/1400 train_loss=0.001526
pass 10/10 batch 981/1400 train_loss=0.001167
pass 10/10 batch 1121/1400 train_loss=0.001206
pass 10/10 batch 1261/1400 train_loss=0.001197
Entrenamiento de model_f completado.
Últimos 5 train losses: [0.0012940697459070606, 0.0015732594898774644, 0.0019152802079765972, 0.0010475803359271526, 0.0015861387218429764]
Últimos 5 val losses: [0.0015756190186880768, 0.001561327213057081, 0.0015634009820370404, 0.0015419987725003221, 0.0016036795409104974]
```

Progreso de ECM durante minibatch training (train vs val)

```
In [6]:  # Gráficos de progreso y comparación predicción vs real
         # Helpers de escala (lineal entre espacio original y [0,1])
         # Si cambias la transformación, actualizá estas funciones.
         def scale_to_01(y):
             """Escala y (vector) del rango original [-3,3] a [0,1]."""
             y = np.asarray(y).reshape(-1)
             return (y + 3.0) / 6.0


         def inverse_scale(y01):
             """Vuelve de [0,1] al rango original [-3,3]."""
             y01 = np.asarray(y01).reshape(-1)
             return y01 * 6.0 - 3.0


         def plot_train_val(hist, titulo='ECM - train vs val'):
             """Plotea la historia de ECM. Hist contiene ECM calculados sobre targets escalados [0,1].
             Para mostrar en la escala original se multiplica la MSE por el factor de escala^2
             (si y_orig = a * y_scaled + b, entonces MSE_orig = a^2 * MSE_scaled).
             """
             plt.figure(figsize=(8,4))
             train = np.array(hist.get('train', []))
             val = np.array(hist.get('val', []))
             # factor para pasar MSE de escala [0,1] a original [-3,3]: a = 6 -> a^2 = 36
             factor = 6.0 ** 2
             train_orig = train * factor
             val_orig = val * factor
             x_train = np.arange(len(train))
             plt.plot(x_train, train_orig, label='train (MSE en escala original)')
             if val.size > 0:
                 x_val = np.linspace(0, len(train)-1, len(val)) if len(train)>0 else np.arange(len(val))
                 plt.plot(x_val, val_orig, label='val (MSE en escala original)')
             plt.xlabel('Batch index')
             plt.ylabel('ECM (MSE) [escala original]')
             plt.title(titulo)
             plt.legend()
```

```python
        plt.grid(True)
        plt.show()


def plot_pred_vs_true(X, Y, model, n_samples=500, random_seed=0):
    """Muestra dos gráficos en la escala original ([-3,3]):
    - scatter: pred vs true (línea y=x)
    - series: valores reales vs predicciones para un subconjunto de índices
    Asume que Y recibido está en la misma escala que se usó para entrenar (es decir, [0,1]).
    """
    X_arr = np.asarray(X)
    Y_arr = np.asarray(Y).reshape(-1)
    preds = model.predecir(X_arr).reshape(-1)

    # Convertir ambas series a escala original
    Y_un = inverse_scale(Y_arr)
    preds_un = inverse_scale(preds)

    N = len(Y_un)
    if N == 0:
        print('No hay muestras para graficar')
        return
    rng = np.random.default_rng(random_seed)
    if n_samples is None or n_samples >= N:
        idx = np.arange(N)
    else:
        idx = rng.choice(N, size=n_samples, replace=False)

    # scatter pred vs true (en escala original)
    plt.figure(figsize=(6,6))
    plt.scatter(Y_un[idx], preds_un[idx], alpha=0.6, s=10)
    mn = min(Y_un[idx].min(), preds_un[idx].min())
    mx = max(Y_un[idx].max(), preds_un[idx].max())
    plt.plot([mn, mx], [mn, mx], 'r--', label='y = y_pred')
    plt.xlabel('True y (original scale)')
    plt.ylabel('Predicted y (original scale)')
    plt.title('Predicción vs Real (scatter) - escala original')
    plt.legend()
    plt.grid(True)
    plt.ylim(-3.1, 3.1)
    plt.show()

    # series plot for same indices sorted
    idx_sorted = np.sort(idx)
    plt.figure(figsize=(10,4))
    plt.plot(idx_sorted, Y_un[idx_sorted], 'o-', label='True y (original)', markersize=4)
    plt.plot(idx_sorted, preds_un[idx_sorted], 'x--', label='Predicted y (original)', markersize=4)
    plt.xlabel('Sample index')
    plt.ylabel('y (original scale)')
    plt.title('True vs Predicted (subset) - escala original')
    plt.legend()
    plt.grid(True)
    plt.ylim(-3.1, 3.1)
    plt.show()


def show_prediction_for_xyz(xyz, model):
    """Recibe xyz = [x,y,z] y muestra la predicción del modelo en la escala original junto al valor real."""
    arr = np.asarray(xyz, dtype=float).reshape(1, -1)
    pred_scaled = model.predecir(arr).reshape(-1)[0]
```
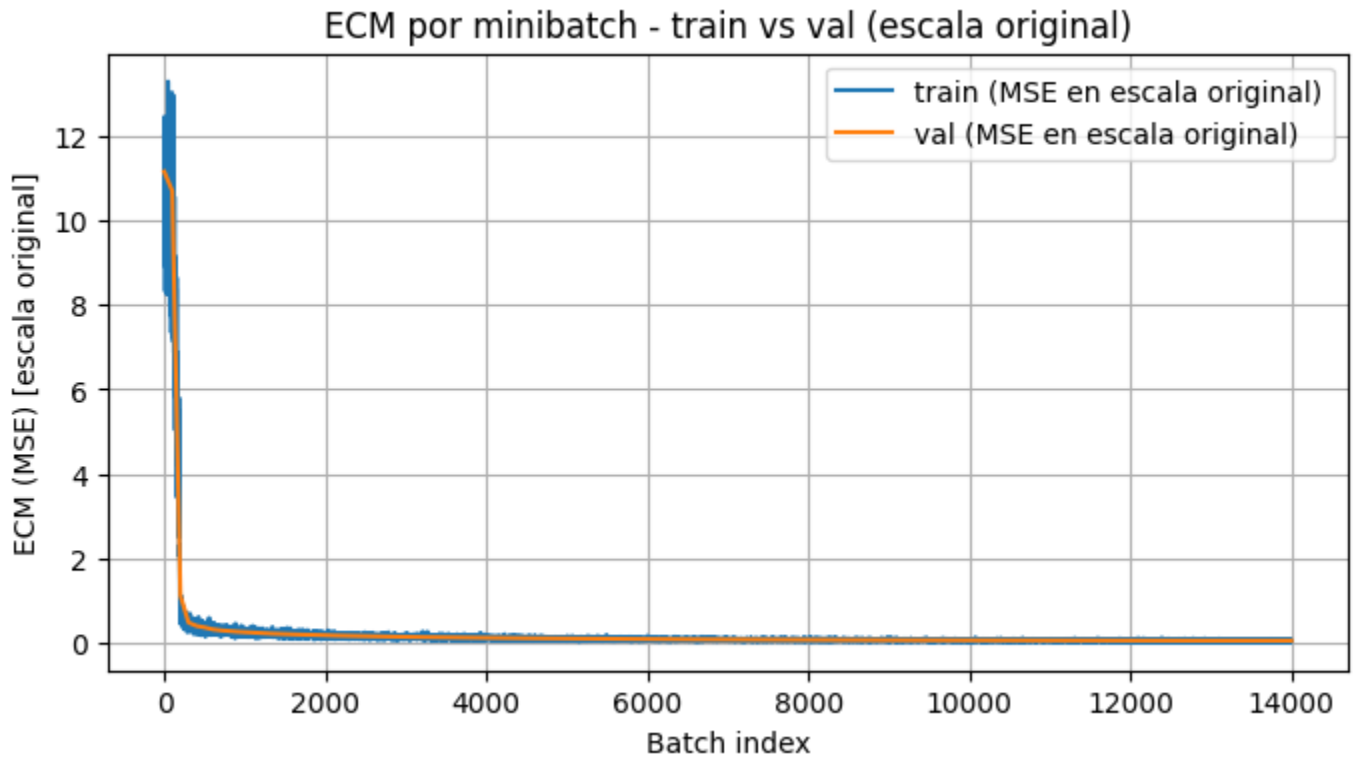
```python
        pred_orig = float(inverse_scale(pred_scaled))
        real = float(np.sin(xyz[0]) + np.cos(xyz[1]) + xyz[2])
        print(f'Entrada (x,y,z): {xyz}')
        print(f'Predicción (escala original): {pred_orig:.6f}')
        print(f'Valor real (escala original): {real:.6f}')
        return pred_orig


# Uso: trazamos train/val si existe el historial 'hist' retornado por minibatch_training
try:
    plot_train_val(hist, 'ECM por minibatch - train vs val (escala original)')
except NameError:
    print('Variable hist no encontrada. Ejecutá la celda de entrenamiento antes de graficar.')

# Uso: comparar pred/true en test set (se asume que y_test_arr está escalado a [0,1])
try:
    plot_pred_vs_true(X_test_arr, y_test_arr, model_f, n_samples=1000)
except NameError:
    print('Asegurate de haber entrenado model_f y de tener X_test_arr / y_test_arr en memoria.')

# Ejemplo: pedir predicción para una muestra concreta (descomentar y editar si querés probar)
# ejemplo_xyz = [0.1, 1.2, -1]
# show_prediction_for_xyz(ejemplo_xyz, model_f)
```
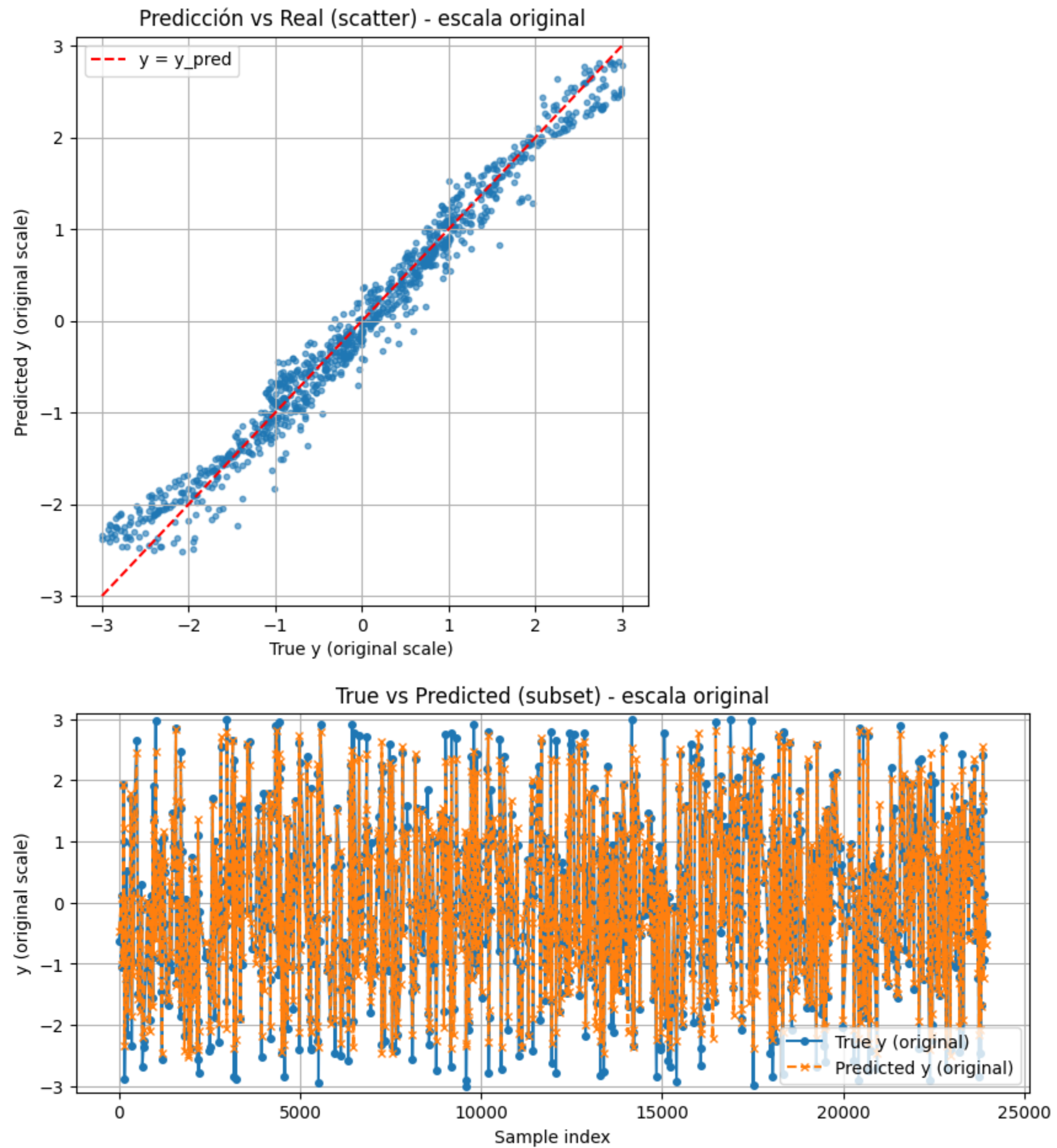

ECM por minibatch - train vs val (escala original)

Predicción vs Real (scatter) - escala original

True vs Predicted (subset) - escala original

```
In [18]:  # === Experimentos: Inciso (a) y (b) ===
          # - (a) Entrenar en el dataset completo y mostrar evolución de error y predicciones
          # - (b) Tomar un conjunto de entrenamiento con 40 muestras y comparar minibatch size = 40 vs = 1
```

```python
import time

# Comprobaciones básicas
try:
    X_train_arr
    y_train_arr
    X_test_arr
    y_test_arr
except NameError:
    raise NameError('Ejecutá antes las celdas que generan y escalan X_train_arr / y_train_arr / X_test_arr / y_test_arr')

rng = np.random.default_rng(42)

# ---- Inciso (a): entrenar con el dataset grande (ya escalado a [0,1]) ----
print('\n--- Inciso (a): entrenamiento en dataset grande (ejemplo) ---')
start = time.time()
model_a = perceptron_multicapa(capas=[30,1], dim_entrada=3)
# parámetros moderados, rápido de correr: 5 pases, minibatch 40
# los epochs deben ser 1 porque queremos mostrar el minibatch solo 1 vez
hist_a = model_a.minibatch_training(X_train_arr, y_train_arr, tamanio=1000, veces=280, lr=0.5, epochs=1, X_val=X_test_arr, Y_val=y_test_arr, eval_every=50, verbose=True)
print(f'Tiempo entrenamiento (a): {time.time()-start:.2f}s')
print('Últimos 5 train losses (scaled):', hist_a['train'][-5:])
if len(hist_a['val'])>0:
    print('Últimos 5 val losses (scaled):', hist_a['val'][-5:])

# Graficar (se muestran en escala original mediante las funciones que añadimos)
plot_train_val(hist_a, 'Inciso (a) - MSE por minibatch (escala original)')
plot_pred_vs_true(X_test_arr, y_test_arr, model_a, n_samples=1000)

# Ejemplo de predicción para una muestra concreta
example_xyz = [0.5, 1.0, -1]
print('\nEjemplo:')
show_prediction_for_xyz(example_xyz, model_a)
##
```

```
--- Inciso (a): entrenamiento en dataset grande (ejemplo) ---
pass 1/280 batch 1/56 train_loss=0.240618 val_loss=0.239537
pass 1/280 batch 6/56 train_loss=0.136683
pass 1/280 batch 11/56 train_loss=0.050067
pass 1/280 batch 16/56 train_loss=0.049026
pass 1/280 batch 21/56 train_loss=0.045392
pass 1/280 batch 26/56 train_loss=0.040658
pass 1/280 batch 31/56 train_loss=0.039118
pass 1/280 batch 36/56 train_loss=0.038170
pass 1/280 batch 41/56 train_loss=0.036701
pass 1/280 batch 46/56 train_loss=0.036926
pass 1/280 batch 51/56 train_loss=0.032716 val_loss=0.035209
pass 1/280 batch 56/56 train_loss=0.031697
pass 2/280 batch 1/56 train_loss=0.033007 val_loss=0.033779
pass 2/280 batch 6/56 train_loss=0.031659
pass 2/280 batch 11/56 train_loss=0.033951
pass 2/280 batch 16/56 train_loss=0.029424
pass 2/280 batch 21/56 train_loss=0.029934
pass 2/280 batch 26/56 train_loss=0.030673
pass 2/280 batch 31/56 train_loss=0.026820
pass 2/280 batch 36/56 train_loss=0.027708
pass 2/280 batch 41/56 train_loss=0.028424
pass 2/280 batch 46/56 train_loss=0.026089
pass 2/280 batch 51/56 train_loss=0.026621 val_loss=0.026703
pass 2/280 batch 56/56 train_loss=0.025769
pass 3/280 batch 1/56 train_loss=0.026145 val_loss=0.026163
pass 3/280 batch 6/56 train_loss=0.024961
pass 3/280 batch 11/56 train_loss=0.027229
pass 3/280 batch 16/56 train_loss=0.026039
pass 3/280 batch 21/56 train_loss=0.025432
pass 3/280 batch 26/56 train_loss=0.023905
pass 3/280 batch 31/56 train_loss=0.024408
pass 3/280 batch 36/56 train_loss=0.024388
pass 3/280 batch 41/56 train_loss=0.022470
pass 3/280 batch 46/56 train_loss=0.023117
pass 3/280 batch 51/56 train_loss=0.021959 val_loss=0.022888
pass 3/280 batch 56/56 train_loss=0.020684
pass 4/280 batch 1/56 train_loss=0.022517 val_loss=0.022633
pass 4/280 batch 6/56 train_loss=0.022810
pass 4/280 batch 11/56 train_loss=0.022024
pass 4/280 batch 16/56 train_loss=0.021415
pass 4/280 batch 21/56 train_loss=0.021274
pass 4/280 batch 26/56 train_loss=0.021060
pass 4/280 batch 31/56 train_loss=0.020810
pass 4/280 batch 36/56 train_loss=0.021070
pass 4/280 batch 41/56 train_loss=0.021109
pass 4/280 batch 46/56 train_loss=0.021204
pass 4/280 batch 51/56 train_loss=0.019677 val_loss=0.020305
pass 4/280 batch 56/56 train_loss=0.021147
pass 5/280 batch 1/56 train_loss=0.021536 val_loss=0.020064
pass 5/280 batch 6/56 train_loss=0.019866
pass 5/280 batch 11/56 train_loss=0.019766
pass 5/280 batch 16/56 train_loss=0.018910
pass 5/280 batch 21/56 train_loss=0.020106
pass 5/280 batch 26/56 train_loss=0.019625
pass 5/280 batch 31/56 train_loss=0.018560
pass 5/280 batch 36/56 train_loss=0.019411
pass 5/280 batch 41/56 train_loss=0.019096
pass 5/280 batch 46/56 train_loss=0.017619
pass 5/280 batch 51/56 train_loss=0.018188 val_loss=0.018300
```

```
pass 5/280 batch 56/56 train_loss=0.017528
pass 6/280 batch 1/56 train_loss=0.017118 val_loss=0.018097
pass 6/280 batch 6/56 train_loss=0.017602
pass 6/280 batch 11/56 train_loss=0.019194
pass 6/280 batch 16/56 train_loss=0.016537
pass 6/280 batch 21/56 train_loss=0.016620
pass 6/280 batch 26/56 train_loss=0.017847
pass 6/280 batch 31/56 train_loss=0.017390
pass 6/280 batch 36/56 train_loss=0.017522
pass 6/280 batch 41/56 train_loss=0.017417
pass 6/280 batch 46/56 train_loss=0.017449
pass 6/280 batch 51/56 train_loss=0.015615 val_loss=0.016671
pass 6/280 batch 56/56 train_loss=0.015927
pass 7/280 batch 1/56 train_loss=0.018108 val_loss=0.016523
pass 7/280 batch 6/56 train_loss=0.017149
pass 7/280 batch 11/56 train_loss=0.016086
pass 7/280 batch 16/56 train_loss=0.015980
pass 7/280 batch 21/56 train_loss=0.016970
pass 7/280 batch 26/56 train_loss=0.015186
pass 7/280 batch 31/56 train_loss=0.015719
pass 7/280 batch 36/56 train_loss=0.014817
pass 7/280 batch 41/56 train_loss=0.014654
pass 7/280 batch 46/56 train_loss=0.015470
pass 7/280 batch 51/56 train_loss=0.015409 val_loss=0.015302
pass 7/280 batch 56/56 train_loss=0.013438
pass 8/280 batch 1/56 train_loss=0.016084 val_loss=0.015162
pass 8/280 batch 6/56 train_loss=0.015243
pass 8/280 batch 11/56 train_loss=0.014522
pass 8/280 batch 16/56 train_loss=0.014235
pass 8/280 batch 21/56 train_loss=0.014977
pass 8/280 batch 26/56 train_loss=0.014731
pass 8/280 batch 31/56 train_loss=0.013366
pass 8/280 batch 36/56 train_loss=0.015859
pass 8/280 batch 41/56 train_loss=0.013593
pass 8/280 batch 46/56 train_loss=0.012739
pass 8/280 batch 51/56 train_loss=0.013597 val_loss=0.014188
pass 8/280 batch 56/56 train_loss=0.014275
pass 9/280 batch 1/56 train_loss=0.014044 val_loss=0.014059
pass 9/280 batch 6/56 train_loss=0.013300
pass 9/280 batch 11/56 train_loss=0.013418
pass 9/280 batch 16/56 train_loss=0.014392
pass 9/280 batch 21/56 train_loss=0.014016
pass 9/280 batch 26/56 train_loss=0.013275
pass 9/280 batch 31/56 train_loss=0.012822
pass 9/280 batch 36/56 train_loss=0.013262
pass 9/280 batch 41/56 train_loss=0.013340
pass 9/280 batch 46/56 train_loss=0.013991
pass 9/280 batch 51/56 train_loss=0.013406 val_loss=0.013226
pass 9/280 batch 56/56 train_loss=0.013469
pass 10/280 batch 1/56 train_loss=0.013488 val_loss=0.013139
pass 10/280 batch 6/56 train_loss=0.012898
pass 10/280 batch 11/56 train_loss=0.012581
pass 10/280 batch 16/56 train_loss=0.013973
pass 10/280 batch 21/56 train_loss=0.013236
pass 10/280 batch 26/56 train_loss=0.012288
pass 10/280 batch 31/56 train_loss=0.012170
pass 10/280 batch 36/56 train_loss=0.012477
pass 10/280 batch 41/56 train_loss=0.011800
pass 10/280 batch 46/56 train_loss=0.013194
pass 10/280 batch 51/56 train_loss=0.012923 val_loss=0.012431
```

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pass 10/280 batch 56/56 train_loss=0.012098
pass 11/280 batch 1/56 train_loss=0.012875 val_loss=0.012360
pass 11/280 batch 6/56 train_loss=0.012539
pass 11/280 batch 11/56 train_loss=0.012454
pass 11/280 batch 16/56 train_loss=0.011377
pass 11/280 batch 21/56 train_loss=0.012458
pass 11/280 batch 26/56 train_loss=0.012296
pass 11/280 batch 31/56 train_loss=0.011936
pass 11/280 batch 36/56 train_loss=0.011150
pass 11/280 batch 41/56 train_loss=0.011733
pass 11/280 batch 46/56 train_loss=0.012261
pass 11/280 batch 51/56 train_loss=0.011541 val_loss=0.011763
pass 11/280 batch 56/56 train_loss=0.011620
pass 12/280 batch 1/56 train_loss=0.010889 val_loss=0.011697
pass 12/280 batch 6/56 train_loss=0.010929
pass 12/280 batch 11/56 train_loss=0.012338
pass 12/280 batch 16/56 train_loss=0.011840
pass 12/280 batch 21/56 train_loss=0.010646
pass 12/280 batch 26/56 train_loss=0.012206
pass 12/280 batch 31/56 train_loss=0.011669
pass 12/280 batch 36/56 train_loss=0.011065
pass 12/280 batch 41/56 train_loss=0.010540
pass 12/280 batch 46/56 train_loss=0.011563
pass 12/280 batch 51/56 train_loss=0.010972 val_loss=0.011187
pass 12/280 batch 56/56 train_loss=0.011147
pass 13/280 batch 1/56 train_loss=0.010772 val_loss=0.011141
pass 13/280 batch 6/56 train_loss=0.010924
pass 13/280 batch 11/56 train_loss=0.010802
pass 13/280 batch 16/56 train_loss=0.010444
pass 13/280 batch 21/56 train_loss=0.010571
pass 13/280 batch 26/56 train_loss=0.010194
pass 13/280 batch 31/56 train_loss=0.011316
pass 13/280 batch 36/56 train_loss=0.010223
pass 13/280 batch 41/56 train_loss=0.010915
pass 13/280 batch 46/56 train_loss=0.011001
pass 13/280 batch 51/56 train_loss=0.010937 val_loss=0.010695
pass 13/280 batch 56/56 train_loss=0.010765
pass 14/280 batch 1/56 train_loss=0.010747 val_loss=0.010650
pass 14/280 batch 6/56 train_loss=0.010212
pass 14/280 batch 11/56 train_loss=0.010232
pass 14/280 batch 16/56 train_loss=0.011434
pass 14/280 batch 21/56 train_loss=0.009876
pass 14/280 batch 26/56 train_loss=0.010122
pass 14/280 batch 31/56 train_loss=0.010337
pass 14/280 batch 36/56 train_loss=0.010449
pass 14/280 batch 41/56 train_loss=0.009312
pass 14/280 batch 46/56 train_loss=0.010747
pass 14/280 batch 51/56 train_loss=0.010543 val_loss=0.010261
pass 14/280 batch 56/56 train_loss=0.009780
pass 15/280 batch 1/56 train_loss=0.010792 val_loss=0.010215
pass 15/280 batch 6/56 train_loss=0.010196
pass 15/280 batch 11/56 train_loss=0.009419
pass 15/280 batch 16/56 train_loss=0.010304
pass 15/280 batch 21/56 train_loss=0.009736
pass 15/280 batch 26/56 train_loss=0.009971
pass 15/280 batch 31/56 train_loss=0.010037
pass 15/280 batch 36/56 train_loss=0.009855
pass 15/280 batch 41/56 train_loss=0.009829
pass 15/280 batch 46/56 train_loss=0.010559
pass 15/280 batch 51/56 train_loss=0.010093 val_loss=0.009890
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pass 15/280 batch 56/56 train_loss=0.009434
pass 16/280 batch 1/56 train_loss=0.010048 val_loss=0.009843
pass 16/280 batch 6/56 train_loss=0.009619
pass 16/280 batch 11/56 train_loss=0.009087
pass 16/280 batch 16/56 train_loss=0.009436
pass 16/280 batch 21/56 train_loss=0.009996
pass 16/280 batch 26/56 train_loss=0.010180
pass 16/280 batch 31/56 train_loss=0.009510
pass 16/280 batch 36/56 train_loss=0.009237
pass 16/280 batch 41/56 train_loss=0.009940
pass 16/280 batch 46/56 train_loss=0.009250
pass 16/280 batch 51/56 train_loss=0.009309 val_loss=0.009544
pass 16/280 batch 56/56 train_loss=0.009801
pass 17/280 batch 1/56 train_loss=0.009461 val_loss=0.009508
pass 17/280 batch 6/56 train_loss=0.009293
pass 17/280 batch 11/56 train_loss=0.009001
pass 17/280 batch 16/56 train_loss=0.009702
pass 17/280 batch 21/56 train_loss=0.009276
pass 17/280 batch 26/56 train_loss=0.010123
pass 17/280 batch 31/56 train_loss=0.009218
pass 17/280 batch 36/56 train_loss=0.009274
pass 17/280 batch 41/56 train_loss=0.009042
pass 17/280 batch 46/56 train_loss=0.008509
pass 17/280 batch 51/56 train_loss=0.009321 val_loss=0.009242
pass 17/280 batch 56/56 train_loss=0.009947
pass 18/280 batch 1/56 train_loss=0.008750 val_loss=0.009214
pass 18/280 batch 6/56 train_loss=0.008547
pass 18/280 batch 11/56 train_loss=0.009568
pass 18/280 batch 16/56 train_loss=0.009265
pass 18/280 batch 21/56 train_loss=0.009716
pass 18/280 batch 26/56 train_loss=0.009471
pass 18/280 batch 31/56 train_loss=0.008487
pass 18/280 batch 36/56 train_loss=0.009614
pass 18/280 batch 41/56 train_loss=0.008909
pass 18/280 batch 46/56 train_loss=0.008373
pass 18/280 batch 51/56 train_loss=0.009081 val_loss=0.008970
pass 18/280 batch 56/56 train_loss=0.009102
pass 19/280 batch 1/56 train_loss=0.008314 val_loss=0.008941
pass 19/280 batch 6/56 train_loss=0.008908
pass 19/280 batch 11/56 train_loss=0.008852
pass 19/280 batch 16/56 train_loss=0.008763
pass 19/280 batch 21/56 train_loss=0.008958
pass 19/280 batch 26/56 train_loss=0.008735
pass 19/280 batch 31/56 train_loss=0.008958
pass 19/280 batch 36/56 train_loss=0.007724
pass 19/280 batch 41/56 train_loss=0.008985
pass 19/280 batch 46/56 train_loss=0.009067
pass 19/280 batch 51/56 train_loss=0.008462 val_loss=0.008726
pass 19/280 batch 56/56 train_loss=0.008654
pass 20/280 batch 1/56 train_loss=0.008755 val_loss=0.008700
pass 20/280 batch 6/56 train_loss=0.009040
pass 20/280 batch 11/56 train_loss=0.007792
pass 20/280 batch 16/56 train_loss=0.008919
pass 20/280 batch 21/56 train_loss=0.008438
pass 20/280 batch 26/56 train_loss=0.008089
pass 20/280 batch 31/56 train_loss=0.008778
pass 20/280 batch 36/56 train_loss=0.008170
pass 20/280 batch 41/56 train_loss=0.008335
pass 20/280 batch 46/56 train_loss=0.008394
pass 20/280 batch 51/56 train_loss=0.008240 val_loss=0.008495
```

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pass 20/280 batch 56/56 train_loss=0.008116
pass 21/280 batch 1/56 train_loss=0.007761 val_loss=0.008491
pass 21/280 batch 6/56 train_loss=0.007705
pass 21/280 batch 11/56 train_loss=0.008009
pass 21/280 batch 16/56 train_loss=0.008652
pass 21/280 batch 21/56 train_loss=0.008169
pass 21/280 batch 26/56 train_loss=0.007932
pass 21/280 batch 31/56 train_loss=0.008583
pass 21/280 batch 36/56 train_loss=0.008584
pass 21/280 batch 41/56 train_loss=0.008147
pass 21/280 batch 46/56 train_loss=0.008431
pass 21/280 batch 51/56 train_loss=0.007771 val_loss=0.008294
pass 21/280 batch 56/56 train_loss=0.008245
pass 22/280 batch 1/56 train_loss=0.008238 val_loss=0.008266
pass 22/280 batch 6/56 train_loss=0.008410
pass 22/280 batch 11/56 train_loss=0.007527
pass 22/280 batch 16/56 train_loss=0.008316
pass 22/280 batch 21/56 train_loss=0.008310
pass 22/280 batch 26/56 train_loss=0.008408
pass 22/280 batch 31/56 train_loss=0.007988
pass 22/280 batch 36/56 train_loss=0.007304
pass 22/280 batch 41/56 train_loss=0.008173
pass 22/280 batch 46/56 train_loss=0.008037
pass 22/280 batch 51/56 train_loss=0.007781 val_loss=0.008101
pass 22/280 batch 56/56 train_loss=0.007711
pass 23/280 batch 1/56 train_loss=0.008189 val_loss=0.008078
pass 23/280 batch 6/56 train_loss=0.007722
pass 23/280 batch 11/56 train_loss=0.007542
pass 23/280 batch 16/56 train_loss=0.008111
pass 23/280 batch 21/56 train_loss=0.008448
pass 23/280 batch 26/56 train_loss=0.007483
pass 23/280 batch 31/56 train_loss=0.007465
pass 23/280 batch 36/56 train_loss=0.007915
pass 23/280 batch 41/56 train_loss=0.007729
pass 23/280 batch 46/56 train_loss=0.007212
pass 23/280 batch 51/56 train_loss=0.007888 val_loss=0.007925
pass 23/280 batch 56/56 train_loss=0.008207
pass 24/280 batch 1/56 train_loss=0.007867 val_loss=0.007905
pass 24/280 batch 6/56 train_loss=0.007829
pass 24/280 batch 11/56 train_loss=0.007279
pass 24/280 batch 16/56 train_loss=0.007219
pass 24/280 batch 21/56 train_loss=0.007979
pass 24/280 batch 26/56 train_loss=0.007783
pass 24/280 batch 31/56 train_loss=0.007292
pass 24/280 batch 36/56 train_loss=0.008223
pass 24/280 batch 41/56 train_loss=0.007235
pass 24/280 batch 46/56 train_loss=0.007449
pass 24/280 batch 51/56 train_loss=0.007221 val_loss=0.007762
pass 24/280 batch 56/56 train_loss=0.007314
pass 25/280 batch 1/56 train_loss=0.007810 val_loss=0.007748
pass 25/280 batch 6/56 train_loss=0.007398
pass 25/280 batch 11/56 train_loss=0.007206
pass 25/280 batch 16/56 train_loss=0.007817
pass 25/280 batch 21/56 train_loss=0.007717
pass 25/280 batch 26/56 train_loss=0.007332
pass 25/280 batch 31/56 train_loss=0.007632
pass 25/280 batch 36/56 train_loss=0.007925
pass 25/280 batch 41/56 train_loss=0.006590
pass 25/280 batch 46/56 train_loss=0.007548
pass 25/280 batch 51/56 train_loss=0.007239 val_loss=0.007609
```

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pass 25/280 batch 56/56 train_loss=0.007080
pass 26/280 batch 1/56 train_loss=0.007372 val_loss=0.007594
pass 26/280 batch 6/56 train_loss=0.007292
pass 26/280 batch 11/56 train_loss=0.007039
pass 26/280 batch 16/56 train_loss=0.007510
pass 26/280 batch 21/56 train_loss=0.007097
pass 26/280 batch 26/56 train_loss=0.007539
pass 26/280 batch 31/56 train_loss=0.007393
pass 26/280 batch 36/56 train_loss=0.007562
pass 26/280 batch 41/56 train_loss=0.006861
pass 26/280 batch 46/56 train_loss=0.007205
pass 26/280 batch 51/56 train_loss=0.007272 val_loss=0.007469
pass 26/280 batch 56/56 train_loss=0.007364
pass 27/280 batch 1/56 train_loss=0.007168 val_loss=0.007455
pass 27/280 batch 6/56 train_loss=0.007250
pass 27/280 batch 11/56 train_loss=0.007252
pass 27/280 batch 16/56 train_loss=0.007658
pass 27/280 batch 21/56 train_loss=0.007347
pass 27/280 batch 26/56 train_loss=0.007972
pass 27/280 batch 31/56 train_loss=0.006741
pass 27/280 batch 36/56 train_loss=0.007201
pass 27/280 batch 41/56 train_loss=0.006373
pass 27/280 batch 46/56 train_loss=0.006730
pass 27/280 batch 51/56 train_loss=0.007330 val_loss=0.007342
pass 27/280 batch 56/56 train_loss=0.007239
pass 28/280 batch 1/56 train_loss=0.006880 val_loss=0.007328
pass 28/280 batch 6/56 train_loss=0.007677
pass 28/280 batch 11/56 train_loss=0.007748
pass 28/280 batch 16/56 train_loss=0.007347
pass 28/280 batch 21/56 train_loss=0.007229
pass 28/280 batch 26/56 train_loss=0.007514
pass 28/280 batch 31/56 train_loss=0.006942
pass 28/280 batch 36/56 train_loss=0.007335
pass 28/280 batch 41/56 train_loss=0.007170
pass 28/280 batch 46/56 train_loss=0.006988
pass 28/280 batch 51/56 train_loss=0.006923 val_loss=0.007219
pass 28/280 batch 56/56 train_loss=0.006642
pass 29/280 batch 1/56 train_loss=0.007210 val_loss=0.007218
pass 29/280 batch 6/56 train_loss=0.007397
pass 29/280 batch 11/56 train_loss=0.006779
pass 29/280 batch 16/56 train_loss=0.007132
pass 29/280 batch 21/56 train_loss=0.007078
pass 29/280 batch 26/56 train_loss=0.006643
pass 29/280 batch 31/56 train_loss=0.006695
pass 29/280 batch 36/56 train_loss=0.007211
pass 29/280 batch 41/56 train_loss=0.006813
pass 29/280 batch 46/56 train_loss=0.007430
pass 29/280 batch 51/56 train_loss=0.007347 val_loss=0.007103
pass 29/280 batch 56/56 train_loss=0.006987
pass 30/280 batch 1/56 train_loss=0.007127 val_loss=0.007102
pass 30/280 batch 6/56 train_loss=0.006953
pass 30/280 batch 11/56 train_loss=0.007000
pass 30/280 batch 16/56 train_loss=0.007170
pass 30/280 batch 21/56 train_loss=0.006886
pass 30/280 batch 26/56 train_loss=0.007023
pass 30/280 batch 31/56 train_loss=0.007418
pass 30/280 batch 36/56 train_loss=0.006540
pass 30/280 batch 41/56 train_loss=0.006635
pass 30/280 batch 46/56 train_loss=0.007060
pass 30/280 batch 51/56 train_loss=0.006354 val_loss=0.006999
```

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pass 30/280 batch 56/56 train_loss=0.006996
pass 31/280 batch 1/56 train_loss=0.006916 val_loss=0.006983
pass 31/280 batch 6/56 train_loss=0.007029
pass 31/280 batch 11/56 train_loss=0.006675
pass 31/280 batch 16/56 train_loss=0.006793
pass 31/280 batch 21/56 train_loss=0.006809
pass 31/280 batch 26/56 train_loss=0.006653
pass 31/280 batch 31/56 train_loss=0.006252
pass 31/280 batch 36/56 train_loss=0.006471
pass 31/280 batch 41/56 train_loss=0.006985
pass 31/280 batch 46/56 train_loss=0.006762
pass 31/280 batch 51/56 train_loss=0.007084 val_loss=0.006893
pass 31/280 batch 56/56 train_loss=0.006450
pass 32/280 batch 1/56 train_loss=0.006877 val_loss=0.006887
pass 32/280 batch 6/56 train_loss=0.007124
pass 32/280 batch 11/56 train_loss=0.006589
pass 32/280 batch 16/56 train_loss=0.006830
pass 32/280 batch 21/56 train_loss=0.006262
pass 32/280 batch 26/56 train_loss=0.006810
pass 32/280 batch 31/56 train_loss=0.006511
pass 32/280 batch 36/56 train_loss=0.007396
pass 32/280 batch 41/56 train_loss=0.006719
pass 32/280 batch 46/56 train_loss=0.006896
pass 32/280 batch 51/56 train_loss=0.006607 val_loss=0.006799
pass 32/280 batch 56/56 train_loss=0.006713
pass 33/280 batch 1/56 train_loss=0.007249 val_loss=0.006791
pass 33/280 batch 6/56 train_loss=0.006989
pass 33/280 batch 11/56 train_loss=0.007009
pass 33/280 batch 16/56 train_loss=0.006358
pass 33/280 batch 21/56 train_loss=0.006979
pass 33/280 batch 26/56 train_loss=0.006864
pass 33/280 batch 31/56 train_loss=0.007195
pass 33/280 batch 36/56 train_loss=0.006680
pass 33/280 batch 41/56 train_loss=0.005954
pass 33/280 batch 46/56 train_loss=0.006931
pass 33/280 batch 51/56 train_loss=0.006924 val_loss=0.006709
pass 33/280 batch 56/56 train_loss=0.006708
pass 34/280 batch 1/56 train_loss=0.006821 val_loss=0.006698
pass 34/280 batch 6/56 train_loss=0.007205
pass 34/280 batch 11/56 train_loss=0.006554
pass 34/280 batch 16/56 train_loss=0.006355
pass 34/280 batch 21/56 train_loss=0.006799
pass 34/280 batch 26/56 train_loss=0.006462
pass 34/280 batch 31/56 train_loss=0.006879
pass 34/280 batch 36/56 train_loss=0.006214
pass 34/280 batch 41/56 train_loss=0.006844
pass 34/280 batch 46/56 train_loss=0.006537
pass 34/280 batch 51/56 train_loss=0.006600 val_loss=0.006624
pass 34/280 batch 56/56 train_loss=0.006333
pass 35/280 batch 1/56 train_loss=0.006530 val_loss=0.006615
pass 35/280 batch 6/56 train_loss=0.006009
pass 35/280 batch 11/56 train_loss=0.006740
pass 35/280 batch 16/56 train_loss=0.006854
pass 35/280 batch 21/56 train_loss=0.006489
pass 35/280 batch 26/56 train_loss=0.006816
pass 35/280 batch 31/56 train_loss=0.006882
pass 35/280 batch 36/56 train_loss=0.006277
pass 35/280 batch 41/56 train_loss=0.006359
pass 35/280 batch 46/56 train_loss=0.006228
pass 35/280 batch 51/56 train_loss=0.006226 val_loss=0.006544
```

```
pass 35/280 batch 56/56 train_loss=0.006397
pass 36/280 batch 1/56 train_loss=0.006440 val_loss=0.006533
pass 36/280 batch 6/56 train_loss=0.005875
pass 36/280 batch 11/56 train_loss=0.006144
pass 36/280 batch 16/56 train_loss=0.006664
pass 36/280 batch 21/56 train_loss=0.006301
pass 36/280 batch 26/56 train_loss=0.006749
pass 36/280 batch 31/56 train_loss=0.006418
pass 36/280 batch 36/56 train_loss=0.006565
pass 36/280 batch 41/56 train_loss=0.006409
pass 36/280 batch 46/56 train_loss=0.006255
pass 36/280 batch 51/56 train_loss=0.006813 val_loss=0.006468
pass 36/280 batch 56/56 train_loss=0.006206
pass 37/280 batch 1/56 train_loss=0.006378 val_loss=0.006458
pass 37/280 batch 6/56 train_loss=0.006114
pass 37/280 batch 11/56 train_loss=0.006341
pass 37/280 batch 16/56 train_loss=0.006255
pass 37/280 batch 21/56 train_loss=0.006584
pass 37/280 batch 26/56 train_loss=0.006557
pass 37/280 batch 31/56 train_loss=0.006572
pass 37/280 batch 36/56 train_loss=0.006510
pass 37/280 batch 41/56 train_loss=0.005963
pass 37/280 batch 46/56 train_loss=0.006186
pass 37/280 batch 51/56 train_loss=0.006381 val_loss=0.006393
pass 37/280 batch 56/56 train_loss=0.006404
pass 38/280 batch 1/56 train_loss=0.006177 val_loss=0.006388
pass 38/280 batch 6/56 train_loss=0.006087
pass 38/280 batch 11/56 train_loss=0.006763
pass 38/280 batch 16/56 train_loss=0.006178
pass 38/280 batch 21/56 train_loss=0.006635
pass 38/280 batch 26/56 train_loss=0.006311
pass 38/280 batch 31/56 train_loss=0.005774
pass 38/280 batch 36/56 train_loss=0.006147
pass 38/280 batch 41/56 train_loss=0.006097
pass 38/280 batch 46/56 train_loss=0.006404
pass 38/280 batch 51/56 train_loss=0.005989 val_loss=0.006322
pass 38/280 batch 56/56 train_loss=0.005898
pass 39/280 batch 1/56 train_loss=0.006330 val_loss=0.006314
pass 39/280 batch 6/56 train_loss=0.006236
pass 39/280 batch 11/56 train_loss=0.006126
pass 39/280 batch 16/56 train_loss=0.005776
pass 39/280 batch 21/56 train_loss=0.006432
pass 39/280 batch 26/56 train_loss=0.005922
pass 39/280 batch 31/56 train_loss=0.006448
pass 39/280 batch 36/56 train_loss=0.006318
pass 39/280 batch 41/56 train_loss=0.006058
pass 39/280 batch 46/56 train_loss=0.005830
pass 39/280 batch 51/56 train_loss=0.006703 val_loss=0.006256
pass 39/280 batch 56/56 train_loss=0.006181
pass 40/280 batch 1/56 train_loss=0.006234 val_loss=0.006249
pass 40/280 batch 6/56 train_loss=0.005917
pass 40/280 batch 11/56 train_loss=0.006022
pass 40/280 batch 16/56 train_loss=0.006237
pass 40/280 batch 21/56 train_loss=0.006116
pass 40/280 batch 26/56 train_loss=0.006121
pass 40/280 batch 31/56 train_loss=0.006114
pass 40/280 batch 36/56 train_loss=0.006133
pass 40/280 batch 41/56 train_loss=0.006374
pass 40/280 batch 46/56 train_loss=0.006182
pass 40/280 batch 51/56 train_loss=0.006272 val_loss=0.006191
```

```
pass 40/280 batch 56/56 train_loss=0.005852
pass 41/280 batch 1/56 train_loss=0.005675 val_loss=0.006197
pass 41/280 batch 6/56 train_loss=0.006003
pass 41/280 batch 11/56 train_loss=0.005869
pass 41/280 batch 16/56 train_loss=0.006119
pass 41/280 batch 21/56 train_loss=0.005770
pass 41/280 batch 26/56 train_loss=0.006262
pass 41/280 batch 31/56 train_loss=0.005362
pass 41/280 batch 36/56 train_loss=0.005982
pass 41/280 batch 41/56 train_loss=0.006165
pass 41/280 batch 46/56 train_loss=0.005957
pass 41/280 batch 51/56 train_loss=0.006424 val_loss=0.006139
pass 41/280 batch 56/56 train_loss=0.006023
pass 42/280 batch 1/56 train_loss=0.005874 val_loss=0.006124
pass 42/280 batch 6/56 train_loss=0.005903
pass 42/280 batch 11/56 train_loss=0.005907
pass 42/280 batch 16/56 train_loss=0.006247
pass 42/280 batch 21/56 train_loss=0.006139
pass 42/280 batch 26/56 train_loss=0.005731
pass 42/280 batch 31/56 train_loss=0.006157
pass 42/280 batch 36/56 train_loss=0.006079
pass 42/280 batch 41/56 train_loss=0.005884
pass 42/280 batch 46/56 train_loss=0.006077
pass 42/280 batch 51/56 train_loss=0.006298 val_loss=0.006071
pass 42/280 batch 56/56 train_loss=0.006332
pass 43/280 batch 1/56 train_loss=0.005837 val_loss=0.006065
pass 43/280 batch 6/56 train_loss=0.006009
pass 43/280 batch 11/56 train_loss=0.006133
pass 43/280 batch 16/56 train_loss=0.006243
pass 43/280 batch 21/56 train_loss=0.005916
pass 43/280 batch 26/56 train_loss=0.006131
pass 43/280 batch 31/56 train_loss=0.006290
pass 43/280 batch 36/56 train_loss=0.005904
pass 43/280 batch 41/56 train_loss=0.005566
pass 43/280 batch 46/56 train_loss=0.006456
pass 43/280 batch 51/56 train_loss=0.005570 val_loss=0.006033
pass 43/280 batch 56/56 train_loss=0.005539
pass 44/280 batch 1/56 train_loss=0.005518 val_loss=0.006020
pass 44/280 batch 6/56 train_loss=0.005721
pass 44/280 batch 11/56 train_loss=0.005971
pass 44/280 batch 16/56 train_loss=0.006116
pass 44/280 batch 21/56 train_loss=0.005912
pass 44/280 batch 26/56 train_loss=0.005889
pass 44/280 batch 31/56 train_loss=0.005936
pass 44/280 batch 36/56 train_loss=0.005897
pass 44/280 batch 41/56 train_loss=0.005922
pass 44/280 batch 46/56 train_loss=0.005747
pass 44/280 batch 51/56 train_loss=0.006283 val_loss=0.005965
pass 44/280 batch 56/56 train_loss=0.005753
pass 45/280 batch 1/56 train_loss=0.005657 val_loss=0.005958
pass 45/280 batch 6/56 train_loss=0.006440
pass 45/280 batch 11/56 train_loss=0.005978
pass 45/280 batch 16/56 train_loss=0.005750
pass 45/280 batch 21/56 train_loss=0.005547
pass 45/280 batch 26/56 train_loss=0.005856
pass 45/280 batch 31/56 train_loss=0.005770
pass 45/280 batch 36/56 train_loss=0.005563
pass 45/280 batch 41/56 train_loss=0.005407
pass 45/280 batch 46/56 train_loss=0.005529
pass 45/280 batch 51/56 train_loss=0.006088 val_loss=0.005907
```

```
pass 45/280 batch 56/56 train_loss=0.005715
pass 46/280 batch 1/56 train_loss=0.005664 val_loss=0.005910
pass 46/280 batch 6/56 train_loss=0.006307
pass 46/280 batch 11/56 train_loss=0.005903
pass 46/280 batch 16/56 train_loss=0.005857
pass 46/280 batch 21/56 train_loss=0.005709
pass 46/280 batch 26/56 train_loss=0.005986
pass 46/280 batch 31/56 train_loss=0.005921
pass 46/280 batch 36/56 train_loss=0.005434
pass 46/280 batch 41/56 train_loss=0.005879
pass 46/280 batch 46/56 train_loss=0.005761
pass 46/280 batch 51/56 train_loss=0.005558 val_loss=0.005856
pass 46/280 batch 56/56 train_loss=0.005578
pass 47/280 batch 1/56 train_loss=0.006110 val_loss=0.005854
pass 47/280 batch 6/56 train_loss=0.005804
pass 47/280 batch 11/56 train_loss=0.005778
pass 47/280 batch 16/56 train_loss=0.005650
pass 47/280 batch 21/56 train_loss=0.006131
pass 47/280 batch 26/56 train_loss=0.005882
pass 47/280 batch 31/56 train_loss=0.005859
pass 47/280 batch 36/56 train_loss=0.005957
pass 47/280 batch 41/56 train_loss=0.005720
pass 47/280 batch 46/56 train_loss=0.005795
pass 47/280 batch 51/56 train_loss=0.005667 val_loss=0.005810
pass 47/280 batch 56/56 train_loss=0.005580
pass 48/280 batch 1/56 train_loss=0.005519 val_loss=0.005811
pass 48/280 batch 6/56 train_loss=0.005732
pass 48/280 batch 11/56 train_loss=0.005631
pass 48/280 batch 16/56 train_loss=0.005930
pass 48/280 batch 21/56 train_loss=0.005337
pass 48/280 batch 26/56 train_loss=0.005648
pass 48/280 batch 31/56 train_loss=0.005700
pass 48/280 batch 36/56 train_loss=0.005502
pass 48/280 batch 41/56 train_loss=0.005507
pass 48/280 batch 46/56 train_loss=0.005669
pass 48/280 batch 51/56 train_loss=0.005129 val_loss=0.005766
pass 48/280 batch 56/56 train_loss=0.006010
pass 49/280 batch 1/56 train_loss=0.005555 val_loss=0.005755
pass 49/280 batch 6/56 train_loss=0.005937
pass 49/280 batch 11/56 train_loss=0.005715
pass 49/280 batch 16/56 train_loss=0.005279
pass 49/280 batch 21/56 train_loss=0.005573
pass 49/280 batch 26/56 train_loss=0.005651
pass 49/280 batch 31/56 train_loss=0.005799
pass 49/280 batch 36/56 train_loss=0.005510
pass 49/280 batch 41/56 train_loss=0.005659
pass 49/280 batch 46/56 train_loss=0.005246
pass 49/280 batch 51/56 train_loss=0.005490 val_loss=0.005719
pass 49/280 batch 56/56 train_loss=0.005628
pass 50/280 batch 1/56 train_loss=0.005993 val_loss=0.005709
pass 50/280 batch 6/56 train_loss=0.005425
pass 50/280 batch 11/56 train_loss=0.005382
pass 50/280 batch 16/56 train_loss=0.005901
pass 50/280 batch 21/56 train_loss=0.005474
pass 50/280 batch 26/56 train_loss=0.005473
pass 50/280 batch 31/56 train_loss=0.005284
pass 50/280 batch 36/56 train_loss=0.005811
pass 50/280 batch 41/56 train_loss=0.005460
pass 50/280 batch 46/56 train_loss=0.005204
pass 50/280 batch 51/56 train_loss=0.005605 val_loss=0.005674
```

```
pass 50/280 batch 56/56 train_loss=0.005118
pass 51/280 batch 1/56 train_loss=0.005716 val_loss=0.005664
pass 51/280 batch 6/56 train_loss=0.005569
pass 51/280 batch 11/56 train_loss=0.005717
pass 51/280 batch 16/56 train_loss=0.005456
pass 51/280 batch 21/56 train_loss=0.005444
pass 51/280 batch 26/56 train_loss=0.005171
pass 51/280 batch 31/56 train_loss=0.005267
pass 51/280 batch 36/56 train_loss=0.005515
pass 51/280 batch 41/56 train_loss=0.005624
pass 51/280 batch 46/56 train_loss=0.005589
pass 51/280 batch 51/56 train_loss=0.005778 val_loss=0.005627
pass 51/280 batch 56/56 train_loss=0.005604
pass 52/280 batch 1/56 train_loss=0.005392 val_loss=0.005620
pass 52/280 batch 6/56 train_loss=0.005712
pass 52/280 batch 11/56 train_loss=0.005638
pass 52/280 batch 16/56 train_loss=0.005278
pass 52/280 batch 21/56 train_loss=0.005676
pass 52/280 batch 26/56 train_loss=0.005689
pass 52/280 batch 31/56 train_loss=0.005679
pass 52/280 batch 36/56 train_loss=0.005483
pass 52/280 batch 41/56 train_loss=0.005688
pass 52/280 batch 46/56 train_loss=0.005447
pass 52/280 batch 51/56 train_loss=0.005580 val_loss=0.005582
pass 52/280 batch 56/56 train_loss=0.005599
pass 53/280 batch 1/56 train_loss=0.005303 val_loss=0.005578
pass 53/280 batch 6/56 train_loss=0.005077
pass 53/280 batch 11/56 train_loss=0.005299
pass 53/280 batch 16/56 train_loss=0.005316
pass 53/280 batch 21/56 train_loss=0.005540
pass 53/280 batch 26/56 train_loss=0.005569
pass 53/280 batch 31/56 train_loss=0.005297
pass 53/280 batch 36/56 train_loss=0.005588
pass 53/280 batch 41/56 train_loss=0.005518
pass 53/280 batch 46/56 train_loss=0.005326
pass 53/280 batch 51/56 train_loss=0.005243 val_loss=0.005556
pass 53/280 batch 56/56 train_loss=0.005419
pass 54/280 batch 1/56 train_loss=0.005490 val_loss=0.005537
pass 54/280 batch 6/56 train_loss=0.005463
pass 54/280 batch 11/56 train_loss=0.005543
pass 54/280 batch 16/56 train_loss=0.005190
pass 54/280 batch 21/56 train_loss=0.005523
pass 54/280 batch 26/56 train_loss=0.005741
pass 54/280 batch 31/56 train_loss=0.005543
pass 54/280 batch 36/56 train_loss=0.005510
pass 54/280 batch 41/56 train_loss=0.005571
pass 54/280 batch 46/56 train_loss=0.005244
pass 54/280 batch 51/56 train_loss=0.005382 val_loss=0.005500
pass 54/280 batch 56/56 train_loss=0.005207
pass 55/280 batch 1/56 train_loss=0.005653 val_loss=0.005495
pass 55/280 batch 6/56 train_loss=0.005262
pass 55/280 batch 11/56 train_loss=0.005547
pass 55/280 batch 16/56 train_loss=0.005317
pass 55/280 batch 21/56 train_loss=0.005276
pass 55/280 batch 26/56 train_loss=0.005672
pass 55/280 batch 31/56 train_loss=0.005285
pass 55/280 batch 36/56 train_loss=0.005288
pass 55/280 batch 41/56 train_loss=0.005434
pass 55/280 batch 46/56 train_loss=0.005382
pass 55/280 batch 51/56 train_loss=0.005391 val_loss=0.005460
```

```
pass 55/280 batch 56/56 train_loss=0.005418
pass 56/280 batch 1/56 train_loss=0.005418 val_loss=0.005464
pass 56/280 batch 6/56 train_loss=0.005541
pass 56/280 batch 11/56 train_loss=0.005707
pass 56/280 batch 16/56 train_loss=0.005064
pass 56/280 batch 21/56 train_loss=0.005521
pass 56/280 batch 26/56 train_loss=0.005358
pass 56/280 batch 31/56 train_loss=0.005248
pass 56/280 batch 36/56 train_loss=0.005093
pass 56/280 batch 41/56 train_loss=0.005164
pass 56/280 batch 46/56 train_loss=0.005457
pass 56/280 batch 51/56 train_loss=0.005137 val_loss=0.005427
pass 56/280 batch 56/56 train_loss=0.005598
pass 57/280 batch 1/56 train_loss=0.005170 val_loss=0.005418
pass 57/280 batch 6/56 train_loss=0.005304
pass 57/280 batch 11/56 train_loss=0.005350
pass 57/280 batch 16/56 train_loss=0.005418
pass 57/280 batch 21/56 train_loss=0.005481
pass 57/280 batch 26/56 train_loss=0.004990
pass 57/280 batch 31/56 train_loss=0.005355
pass 57/280 batch 36/56 train_loss=0.005210
pass 57/280 batch 41/56 train_loss=0.005136
pass 57/280 batch 46/56 train_loss=0.005409
pass 57/280 batch 51/56 train_loss=0.005201 val_loss=0.005382
pass 57/280 batch 56/56 train_loss=0.005262
pass 58/280 batch 1/56 train_loss=0.005403 val_loss=0.005380
pass 58/280 batch 6/56 train_loss=0.005827
pass 58/280 batch 11/56 train_loss=0.005483
pass 58/280 batch 16/56 train_loss=0.005385
pass 58/280 batch 21/56 train_loss=0.005096
pass 58/280 batch 26/56 train_loss=0.005198
pass 58/280 batch 31/56 train_loss=0.005180
pass 58/280 batch 36/56 train_loss=0.005031
pass 58/280 batch 41/56 train_loss=0.004817
pass 58/280 batch 46/56 train_loss=0.005320
pass 58/280 batch 51/56 train_loss=0.005410 val_loss=0.005345
pass 58/280 batch 56/56 train_loss=0.005000
pass 59/280 batch 1/56 train_loss=0.005170 val_loss=0.005353
pass 59/280 batch 6/56 train_loss=0.005191
pass 59/280 batch 11/56 train_loss=0.005591
pass 59/280 batch 16/56 train_loss=0.004862
pass 59/280 batch 21/56 train_loss=0.005027
pass 59/280 batch 26/56 train_loss=0.005434
pass 59/280 batch 31/56 train_loss=0.005188
pass 59/280 batch 36/56 train_loss=0.005436
pass 59/280 batch 41/56 train_loss=0.005145
pass 59/280 batch 46/56 train_loss=0.005244
pass 59/280 batch 51/56 train_loss=0.004965 val_loss=0.005308
pass 59/280 batch 56/56 train_loss=0.005044
pass 60/280 batch 1/56 train_loss=0.004883 val_loss=0.005304
pass 60/280 batch 6/56 train_loss=0.005205
pass 60/280 batch 11/56 train_loss=0.005511
pass 60/280 batch 16/56 train_loss=0.004653
pass 60/280 batch 21/56 train_loss=0.005082
pass 60/280 batch 26/56 train_loss=0.005247
pass 60/280 batch 31/56 train_loss=0.005418
pass 60/280 batch 36/56 train_loss=0.004951
pass 60/280 batch 41/56 train_loss=0.005222
pass 60/280 batch 46/56 train_loss=0.004985
pass 60/280 batch 51/56 train_loss=0.004908 val_loss=0.005275
```

```
pass 60/280 batch 56/56 train_loss=0.005359
pass 61/280 batch 1/56 train_loss=0.005445 val_loss=0.005269
pass 61/280 batch 6/56 train_loss=0.005657
pass 61/280 batch 11/56 train_loss=0.005199
pass 61/280 batch 16/56 train_loss=0.005180
pass 61/280 batch 21/56 train_loss=0.005117
pass 61/280 batch 26/56 train_loss=0.005331
pass 61/280 batch 31/56 train_loss=0.005351
pass 61/280 batch 36/56 train_loss=0.005141
pass 61/280 batch 41/56 train_loss=0.005437
pass 61/280 batch 46/56 train_loss=0.005031
pass 61/280 batch 51/56 train_loss=0.005455 val_loss=0.005242
pass 61/280 batch 56/56 train_loss=0.005146
pass 62/280 batch 1/56 train_loss=0.004922 val_loss=0.005242
pass 62/280 batch 6/56 train_loss=0.004890
pass 62/280 batch 11/56 train_loss=0.005141
pass 62/280 batch 16/56 train_loss=0.005369
pass 62/280 batch 21/56 train_loss=0.004847
pass 62/280 batch 26/56 train_loss=0.005333
pass 62/280 batch 31/56 train_loss=0.005232
pass 62/280 batch 36/56 train_loss=0.005223
pass 62/280 batch 41/56 train_loss=0.005043
pass 62/280 batch 46/56 train_loss=0.005329
pass 62/280 batch 51/56 train_loss=0.005052 val_loss=0.005202
pass 62/280 batch 56/56 train_loss=0.005104
pass 63/280 batch 1/56 train_loss=0.004740 val_loss=0.005206
pass 63/280 batch 6/56 train_loss=0.005024
pass 63/280 batch 11/56 train_loss=0.004934
pass 63/280 batch 16/56 train_loss=0.004591
pass 63/280 batch 21/56 train_loss=0.005081
pass 63/280 batch 26/56 train_loss=0.005107
pass 63/280 batch 31/56 train_loss=0.005114
pass 63/280 batch 36/56 train_loss=0.005305
pass 63/280 batch 41/56 train_loss=0.005064
pass 63/280 batch 46/56 train_loss=0.004890
pass 63/280 batch 51/56 train_loss=0.004943 val_loss=0.005167
pass 63/280 batch 56/56 train_loss=0.005370
pass 64/280 batch 1/56 train_loss=0.005096 val_loss=0.005166
pass 64/280 batch 6/56 train_loss=0.005120
pass 64/280 batch 11/56 train_loss=0.005140
pass 64/280 batch 16/56 train_loss=0.005033
pass 64/280 batch 21/56 train_loss=0.005319
pass 64/280 batch 26/56 train_loss=0.004971
pass 64/280 batch 31/56 train_loss=0.005066
pass 64/280 batch 36/56 train_loss=0.005262
pass 64/280 batch 41/56 train_loss=0.005080
pass 64/280 batch 46/56 train_loss=0.004922
pass 64/280 batch 51/56 train_loss=0.005028 val_loss=0.005133
pass 64/280 batch 56/56 train_loss=0.005148
pass 65/280 batch 1/56 train_loss=0.004939 val_loss=0.005133
pass 65/280 batch 6/56 train_loss=0.004929
pass 65/280 batch 11/56 train_loss=0.004914
pass 65/280 batch 16/56 train_loss=0.005041
pass 65/280 batch 21/56 train_loss=0.005330
pass 65/280 batch 26/56 train_loss=0.004836
pass 65/280 batch 31/56 train_loss=0.004913
pass 65/280 batch 36/56 train_loss=0.004827
pass 65/280 batch 41/56 train_loss=0.004806
pass 65/280 batch 46/56 train_loss=0.005380
pass 65/280 batch 51/56 train_loss=0.005284 val_loss=0.005099
```

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pass 65/280 batch 56/56 train_loss=0.004865
pass 66/280 batch 1/56 train_loss=0.004878 val_loss=0.005095
pass 66/280 batch 6/56 train_loss=0.004973
pass 66/280 batch 11/56 train_loss=0.004407
pass 66/280 batch 16/56 train_loss=0.004905
pass 66/280 batch 21/56 train_loss=0.004539
pass 66/280 batch 26/56 train_loss=0.005283
pass 66/280 batch 31/56 train_loss=0.004914
pass 66/280 batch 36/56 train_loss=0.005232
pass 66/280 batch 41/56 train_loss=0.004887
pass 66/280 batch 46/56 train_loss=0.005105
pass 66/280 batch 51/56 train_loss=0.004682 val_loss=0.005067
pass 66/280 batch 56/56 train_loss=0.005141
pass 67/280 batch 1/56 train_loss=0.004825 val_loss=0.005064
pass 67/280 batch 6/56 train_loss=0.004967
pass 67/280 batch 11/56 train_loss=0.004785
pass 67/280 batch 16/56 train_loss=0.005032
pass 67/280 batch 21/56 train_loss=0.004951
pass 67/280 batch 26/56 train_loss=0.005049
pass 67/280 batch 31/56 train_loss=0.004790
pass 67/280 batch 36/56 train_loss=0.004858
pass 67/280 batch 41/56 train_loss=0.004929
pass 67/280 batch 46/56 train_loss=0.004935
pass 67/280 batch 51/56 train_loss=0.005252 val_loss=0.005035
pass 67/280 batch 56/56 train_loss=0.004836
pass 68/280 batch 1/56 train_loss=0.004991 val_loss=0.005033
pass 68/280 batch 6/56 train_loss=0.004700
pass 68/280 batch 11/56 train_loss=0.004714
pass 68/280 batch 16/56 train_loss=0.005015
pass 68/280 batch 21/56 train_loss=0.005250
pass 68/280 batch 26/56 train_loss=0.004982
pass 68/280 batch 31/56 train_loss=0.004972
pass 68/280 batch 36/56 train_loss=0.004860
pass 68/280 batch 41/56 train_loss=0.004813
pass 68/280 batch 46/56 train_loss=0.005002
pass 68/280 batch 51/56 train_loss=0.004833 val_loss=0.005004
pass 68/280 batch 56/56 train_loss=0.005048
pass 69/280 batch 1/56 train_loss=0.005259 val_loss=0.005000
pass 69/280 batch 6/56 train_loss=0.004734
pass 69/280 batch 11/56 train_loss=0.004675
pass 69/280 batch 16/56 train_loss=0.005134
pass 69/280 batch 21/56 train_loss=0.005251
pass 69/280 batch 26/56 train_loss=0.005020
pass 69/280 batch 31/56 train_loss=0.004687
pass 69/280 batch 36/56 train_loss=0.004766
pass 69/280 batch 41/56 train_loss=0.004959
pass 69/280 batch 46/56 train_loss=0.005079
pass 69/280 batch 51/56 train_loss=0.004441 val_loss=0.004972
pass 69/280 batch 56/56 train_loss=0.004560
pass 70/280 batch 1/56 train_loss=0.004701 val_loss=0.004967
pass 70/280 batch 6/56 train_loss=0.004737
pass 70/280 batch 11/56 train_loss=0.004764
pass 70/280 batch 16/56 train_loss=0.004797
pass 70/280 batch 21/56 train_loss=0.005009
pass 70/280 batch 26/56 train_loss=0.004887
pass 70/280 batch 31/56 train_loss=0.004950
pass 70/280 batch 36/56 train_loss=0.004520
pass 70/280 batch 41/56 train_loss=0.005223
pass 70/280 batch 46/56 train_loss=0.005082
pass 70/280 batch 51/56 train_loss=0.004803 val_loss=0.004938
```

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pass 70/280 batch 56/56 train_loss=0.004583
pass 71/280 batch 1/56 train_loss=0.004854 val_loss=0.004934
pass 71/280 batch 6/56 train_loss=0.004788
pass 71/280 batch 11/56 train_loss=0.004616
pass 71/280 batch 16/56 train_loss=0.004836
pass 71/280 batch 21/56 train_loss=0.004658
pass 71/280 batch 26/56 train_loss=0.004650
pass 71/280 batch 31/56 train_loss=0.004907
pass 71/280 batch 36/56 train_loss=0.004959
pass 71/280 batch 41/56 train_loss=0.004712
pass 71/280 batch 46/56 train_loss=0.004775
pass 71/280 batch 51/56 train_loss=0.005270 val_loss=0.004906
pass 71/280 batch 56/56 train_loss=0.004693
pass 72/280 batch 1/56 train_loss=0.004948 val_loss=0.004903
pass 72/280 batch 6/56 train_loss=0.005095
pass 72/280 batch 11/56 train_loss=0.004820
pass 72/280 batch 16/56 train_loss=0.004913
pass 72/280 batch 21/56 train_loss=0.004813
pass 72/280 batch 26/56 train_loss=0.004870
pass 72/280 batch 31/56 train_loss=0.004989
pass 72/280 batch 36/56 train_loss=0.004757
pass 72/280 batch 41/56 train_loss=0.004727
pass 72/280 batch 46/56 train_loss=0.004464
pass 72/280 batch 51/56 train_loss=0.004976 val_loss=0.004876
pass 72/280 batch 56/56 train_loss=0.004655
pass 73/280 batch 1/56 train_loss=0.004634 val_loss=0.004874
pass 73/280 batch 6/56 train_loss=0.004734
pass 73/280 batch 11/56 train_loss=0.004657
pass 73/280 batch 16/56 train_loss=0.004703
pass 73/280 batch 21/56 train_loss=0.004760
pass 73/280 batch 26/56 train_loss=0.005012
pass 73/280 batch 31/56 train_loss=0.004809
pass 73/280 batch 36/56 train_loss=0.004940
pass 73/280 batch 41/56 train_loss=0.004598
pass 73/280 batch 46/56 train_loss=0.004367
pass 73/280 batch 51/56 train_loss=0.004956 val_loss=0.004846
pass 73/280 batch 56/56 train_loss=0.005027
pass 74/280 batch 1/56 train_loss=0.004616 val_loss=0.004843
pass 74/280 batch 6/56 train_loss=0.005035
pass 74/280 batch 11/56 train_loss=0.005043
pass 74/280 batch 16/56 train_loss=0.004347
pass 74/280 batch 21/56 train_loss=0.004848
pass 74/280 batch 26/56 train_loss=0.004715
pass 74/280 batch 31/56 train_loss=0.004662
pass 74/280 batch 36/56 train_loss=0.004805
pass 74/280 batch 41/56 train_loss=0.004636
pass 74/280 batch 46/56 train_loss=0.004584
pass 74/280 batch 51/56 train_loss=0.004395 val_loss=0.004822
pass 74/280 batch 56/56 train_loss=0.005055
pass 75/280 batch 1/56 train_loss=0.004624 val_loss=0.004811
pass 75/280 batch 6/56 train_loss=0.004335
pass 75/280 batch 11/56 train_loss=0.005080
pass 75/280 batch 16/56 train_loss=0.004805
pass 75/280 batch 21/56 train_loss=0.004670
pass 75/280 batch 26/56 train_loss=0.004418
pass 75/280 batch 31/56 train_loss=0.004564
pass 75/280 batch 36/56 train_loss=0.004896
pass 75/280 batch 41/56 train_loss=0.004740
pass 75/280 batch 46/56 train_loss=0.004760
pass 75/280 batch 51/56 train_loss=0.004739 val_loss=0.004786
```

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pass 75/280 batch 56/56 train_loss=0.004945
pass 76/280 batch 1/56 train_loss=0.004942 val_loss=0.004780
pass 76/280 batch 6/56 train_loss=0.004984
pass 76/280 batch 11/56 train_loss=0.004931
pass 76/280 batch 16/56 train_loss=0.004641
pass 76/280 batch 21/56 train_loss=0.004682
pass 76/280 batch 26/56 train_loss=0.004615
pass 76/280 batch 31/56 train_loss=0.004622
pass 76/280 batch 36/56 train_loss=0.004805
pass 76/280 batch 41/56 train_loss=0.004887
pass 76/280 batch 46/56 train_loss=0.004773
pass 76/280 batch 51/56 train_loss=0.004888 val_loss=0.004753
pass 76/280 batch 56/56 train_loss=0.004887
pass 77/280 batch 1/56 train_loss=0.004781 val_loss=0.004751
pass 77/280 batch 6/56 train_loss=0.005056
pass 77/280 batch 11/56 train_loss=0.004733
pass 77/280 batch 16/56 train_loss=0.004349
pass 77/280 batch 21/56 train_loss=0.004372
pass 77/280 batch 26/56 train_loss=0.004449
pass 77/280 batch 31/56 train_loss=0.005053
pass 77/280 batch 36/56 train_loss=0.004449
pass 77/280 batch 41/56 train_loss=0.004887
pass 77/280 batch 46/56 train_loss=0.004784
pass 77/280 batch 51/56 train_loss=0.004557 val_loss=0.004726
pass 77/280 batch 56/56 train_loss=0.004680
pass 78/280 batch 1/56 train_loss=0.004816 val_loss=0.004721
pass 78/280 batch 6/56 train_loss=0.004593
pass 78/280 batch 11/56 train_loss=0.004624
pass 78/280 batch 16/56 train_loss=0.004788
pass 78/280 batch 21/56 train_loss=0.004362
pass 78/280 batch 26/56 train_loss=0.004708
pass 78/280 batch 31/56 train_loss=0.004542
pass 78/280 batch 36/56 train_loss=0.004680
pass 78/280 batch 41/56 train_loss=0.004615
pass 78/280 batch 46/56 train_loss=0.004336
pass 78/280 batch 51/56 train_loss=0.004785 val_loss=0.004694
pass 78/280 batch 56/56 train_loss=0.004359
pass 79/280 batch 1/56 train_loss=0.004516 val_loss=0.004691
pass 79/280 batch 6/56 train_loss=0.004401
pass 79/280 batch 11/56 train_loss=0.004465
pass 79/280 batch 16/56 train_loss=0.004606
pass 79/280 batch 21/56 train_loss=0.004710
pass 79/280 batch 26/56 train_loss=0.004902
pass 79/280 batch 31/56 train_loss=0.004630
pass 79/280 batch 36/56 train_loss=0.004466
pass 79/280 batch 41/56 train_loss=0.004738
pass 79/280 batch 46/56 train_loss=0.004652
pass 79/280 batch 51/56 train_loss=0.004248 val_loss=0.004668
pass 79/280 batch 56/56 train_loss=0.004534
pass 80/280 batch 1/56 train_loss=0.004585 val_loss=0.004667
pass 80/280 batch 6/56 train_loss=0.004749
pass 80/280 batch 11/56 train_loss=0.004492
pass 80/280 batch 16/56 train_loss=0.004460
pass 80/280 batch 21/56 train_loss=0.004525
pass 80/280 batch 26/56 train_loss=0.004491
pass 80/280 batch 31/56 train_loss=0.004213
pass 80/280 batch 36/56 train_loss=0.004150
pass 80/280 batch 41/56 train_loss=0.004497
pass 80/280 batch 46/56 train_loss=0.004568
pass 80/280 batch 51/56 train_loss=0.004595 val_loss=0.004635
```

```
pass 80/280 batch 56/56 train_loss=0.004423
pass 81/280 batch 1/56 train_loss=0.004491 val_loss=0.004632
pass 81/280 batch 6/56 train_loss=0.004650
pass 81/280 batch 11/56 train_loss=0.004595
pass 81/280 batch 16/56 train_loss=0.004796
pass 81/280 batch 21/56 train_loss=0.004504
pass 81/280 batch 26/56 train_loss=0.004342
pass 81/280 batch 31/56 train_loss=0.004179
pass 81/280 batch 36/56 train_loss=0.004436
pass 81/280 batch 41/56 train_loss=0.004523
pass 81/280 batch 46/56 train_loss=0.004647
pass 81/280 batch 51/56 train_loss=0.004573 val_loss=0.004608
pass 81/280 batch 56/56 train_loss=0.004338
pass 82/280 batch 1/56 train_loss=0.004287 val_loss=0.004607
pass 82/280 batch 6/56 train_loss=0.004299
pass 82/280 batch 11/56 train_loss=0.004324
pass 82/280 batch 16/56 train_loss=0.004803
pass 82/280 batch 21/56 train_loss=0.004635
pass 82/280 batch 26/56 train_loss=0.004496
pass 82/280 batch 31/56 train_loss=0.004310
pass 82/280 batch 36/56 train_loss=0.004298
pass 82/280 batch 41/56 train_loss=0.004707
pass 82/280 batch 46/56 train_loss=0.004691
pass 82/280 batch 51/56 train_loss=0.004334 val_loss=0.004578
pass 82/280 batch 56/56 train_loss=0.004507
pass 83/280 batch 1/56 train_loss=0.004951 val_loss=0.004574
pass 83/280 batch 6/56 train_loss=0.004374
pass 83/280 batch 11/56 train_loss=0.004668
pass 83/280 batch 16/56 train_loss=0.004606
pass 83/280 batch 21/56 train_loss=0.004442
pass 83/280 batch 26/56 train_loss=0.004369
pass 83/280 batch 31/56 train_loss=0.004460
pass 83/280 batch 36/56 train_loss=0.004533
pass 83/280 batch 41/56 train_loss=0.004230
pass 83/280 batch 46/56 train_loss=0.004592
pass 83/280 batch 51/56 train_loss=0.004551 val_loss=0.004548
pass 83/280 batch 56/56 train_loss=0.004528
pass 84/280 batch 1/56 train_loss=0.004504 val_loss=0.004545
pass 84/280 batch 6/56 train_loss=0.004473
pass 84/280 batch 11/56 train_loss=0.004284
pass 84/280 batch 16/56 train_loss=0.004725
pass 84/280 batch 21/56 train_loss=0.004231
pass 84/280 batch 26/56 train_loss=0.004427
pass 84/280 batch 31/56 train_loss=0.004375
pass 84/280 batch 36/56 train_loss=0.004398
pass 84/280 batch 41/56 train_loss=0.004384
pass 84/280 batch 46/56 train_loss=0.004456
pass 84/280 batch 51/56 train_loss=0.004260 val_loss=0.004519
pass 84/280 batch 56/56 train_loss=0.004392
pass 85/280 batch 1/56 train_loss=0.004516 val_loss=0.004516
pass 85/280 batch 6/56 train_loss=0.004569
pass 85/280 batch 11/56 train_loss=0.004315
pass 85/280 batch 16/56 train_loss=0.004635
pass 85/280 batch 21/56 train_loss=0.004153
pass 85/280 batch 26/56 train_loss=0.004374
pass 85/280 batch 31/56 train_loss=0.004240
pass 85/280 batch 36/56 train_loss=0.004263
pass 85/280 batch 41/56 train_loss=0.004224
pass 85/280 batch 46/56 train_loss=0.004583
pass 85/280 batch 51/56 train_loss=0.004330 val_loss=0.004490
```

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pass 85/280 batch 56/56 train_loss=0.004512
pass 86/280 batch 1/56 train_loss=0.004387 val_loss=0.004488
pass 86/280 batch 6/56 train_loss=0.004317
pass 86/280 batch 11/56 train_loss=0.003984
pass 86/280 batch 16/56 train_loss=0.004351
pass 86/280 batch 21/56 train_loss=0.004403
pass 86/280 batch 26/56 train_loss=0.004542
pass 86/280 batch 31/56 train_loss=0.004727
pass 86/280 batch 36/56 train_loss=0.004049
pass 86/280 batch 41/56 train_loss=0.003985
pass 86/280 batch 46/56 train_loss=0.004271
pass 86/280 batch 51/56 train_loss=0.004368 val_loss=0.004462
pass 86/280 batch 56/56 train_loss=0.004401
pass 87/280 batch 1/56 train_loss=0.004438 val_loss=0.004458
pass 87/280 batch 6/56 train_loss=0.004162
pass 87/280 batch 11/56 train_loss=0.004522
pass 87/280 batch 16/56 train_loss=0.004585
pass 87/280 batch 21/56 train_loss=0.004673
pass 87/280 batch 26/56 train_loss=0.004342
pass 87/280 batch 31/56 train_loss=0.004564
pass 87/280 batch 36/56 train_loss=0.004322
pass 87/280 batch 41/56 train_loss=0.004726
pass 87/280 batch 46/56 train_loss=0.004401
pass 87/280 batch 51/56 train_loss=0.004195 val_loss=0.004433
pass 87/280 batch 56/56 train_loss=0.004290
pass 88/280 batch 1/56 train_loss=0.004540 val_loss=0.004430
pass 88/280 batch 6/56 train_loss=0.004250
pass 88/280 batch 11/56 train_loss=0.004571
pass 88/280 batch 16/56 train_loss=0.004340
pass 88/280 batch 21/56 train_loss=0.004355
pass 88/280 batch 26/56 train_loss=0.004283
pass 88/280 batch 31/56 train_loss=0.004402
pass 88/280 batch 36/56 train_loss=0.004305
pass 88/280 batch 41/56 train_loss=0.003950
pass 88/280 batch 46/56 train_loss=0.004075
pass 88/280 batch 51/56 train_loss=0.004327 val_loss=0.004406
pass 88/280 batch 56/56 train_loss=0.003987
pass 89/280 batch 1/56 train_loss=0.004272 val_loss=0.004402
pass 89/280 batch 6/56 train_loss=0.004308
pass 89/280 batch 11/56 train_loss=0.004554
pass 89/280 batch 16/56 train_loss=0.004519
pass 89/280 batch 21/56 train_loss=0.004141
pass 89/280 batch 26/56 train_loss=0.004226
pass 89/280 batch 31/56 train_loss=0.004541
pass 89/280 batch 36/56 train_loss=0.004398
pass 89/280 batch 41/56 train_loss=0.004063
pass 89/280 batch 46/56 train_loss=0.004612
pass 89/280 batch 51/56 train_loss=0.004465 val_loss=0.004379
pass 89/280 batch 56/56 train_loss=0.004291
pass 90/280 batch 1/56 train_loss=0.004303 val_loss=0.004374
pass 90/280 batch 6/56 train_loss=0.003844
pass 90/280 batch 11/56 train_loss=0.003970
pass 90/280 batch 16/56 train_loss=0.004326
pass 90/280 batch 21/56 train_loss=0.004434
pass 90/280 batch 26/56 train_loss=0.004348
pass 90/280 batch 31/56 train_loss=0.004469
pass 90/280 batch 36/56 train_loss=0.004266
pass 90/280 batch 41/56 train_loss=0.004377
pass 90/280 batch 46/56 train_loss=0.004366
pass 90/280 batch 51/56 train_loss=0.004375 val_loss=0.004348
```

```
pass 90/280 batch 56/56 train_loss=0.004274
pass 91/280 batch 1/56 train_loss=0.004475 val_loss=0.004345
pass 91/280 batch 6/56 train_loss=0.003979
pass 91/280 batch 11/56 train_loss=0.004599
pass 91/280 batch 16/56 train_loss=0.004379
pass 91/280 batch 21/56 train_loss=0.004041
pass 91/280 batch 26/56 train_loss=0.004110
pass 91/280 batch 31/56 train_loss=0.004411
pass 91/280 batch 36/56 train_loss=0.004463
pass 91/280 batch 41/56 train_loss=0.004257
pass 91/280 batch 46/56 train_loss=0.004229
pass 91/280 batch 51/56 train_loss=0.004245 val_loss=0.004321
pass 91/280 batch 56/56 train_loss=0.004189
pass 92/280 batch 1/56 train_loss=0.004559 val_loss=0.004317
pass 92/280 batch 6/56 train_loss=0.004163
pass 92/280 batch 11/56 train_loss=0.004213
pass 92/280 batch 16/56 train_loss=0.004162
pass 92/280 batch 21/56 train_loss=0.004059
pass 92/280 batch 26/56 train_loss=0.004165
pass 92/280 batch 31/56 train_loss=0.003986
pass 92/280 batch 36/56 train_loss=0.004368
pass 92/280 batch 41/56 train_loss=0.004550
pass 92/280 batch 46/56 train_loss=0.004390
pass 92/280 batch 51/56 train_loss=0.004132 val_loss=0.004292
pass 92/280 batch 56/56 train_loss=0.004116
pass 93/280 batch 1/56 train_loss=0.004042 val_loss=0.004294
pass 93/280 batch 6/56 train_loss=0.003885
pass 93/280 batch 11/56 train_loss=0.004252
pass 93/280 batch 16/56 train_loss=0.004311
pass 93/280 batch 21/56 train_loss=0.003923
pass 93/280 batch 26/56 train_loss=0.004149
pass 93/280 batch 31/56 train_loss=0.003958
pass 93/280 batch 36/56 train_loss=0.004306
pass 93/280 batch 41/56 train_loss=0.004219
pass 93/280 batch 46/56 train_loss=0.004186
pass 93/280 batch 51/56 train_loss=0.004060 val_loss=0.004276
pass 93/280 batch 56/56 train_loss=0.004257
pass 94/280 batch 1/56 train_loss=0.004183 val_loss=0.004261
pass 94/280 batch 6/56 train_loss=0.004327
pass 94/280 batch 11/56 train_loss=0.003939
pass 94/280 batch 16/56 train_loss=0.003847
pass 94/280 batch 21/56 train_loss=0.004123
pass 94/280 batch 26/56 train_loss=0.004323
pass 94/280 batch 31/56 train_loss=0.004100
pass 94/280 batch 36/56 train_loss=0.004750
pass 94/280 batch 41/56 train_loss=0.004190
pass 94/280 batch 46/56 train_loss=0.004071
pass 94/280 batch 51/56 train_loss=0.004019 val_loss=0.004236
pass 94/280 batch 56/56 train_loss=0.004251
pass 95/280 batch 1/56 train_loss=0.004136 val_loss=0.004233
pass 95/280 batch 6/56 train_loss=0.003661
pass 95/280 batch 11/56 train_loss=0.004171
pass 95/280 batch 16/56 train_loss=0.004250
pass 95/280 batch 21/56 train_loss=0.004000
pass 95/280 batch 26/56 train_loss=0.003993
pass 95/280 batch 31/56 train_loss=0.004014
pass 95/280 batch 36/56 train_loss=0.004073
pass 95/280 batch 41/56 train_loss=0.004267
pass 95/280 batch 46/56 train_loss=0.004398
pass 95/280 batch 51/56 train_loss=0.004094 val_loss=0.004208
```

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pass 95/280 batch 56/56 train_loss=0.004200
pass 96/280 batch 1/56 train_loss=0.004306 val_loss=0.004205
pass 96/280 batch 6/56 train_loss=0.003994
pass 96/280 batch 11/56 train_loss=0.004045
pass 96/280 batch 16/56 train_loss=0.004092
pass 96/280 batch 21/56 train_loss=0.004062
pass 96/280 batch 26/56 train_loss=0.004138
pass 96/280 batch 31/56 train_loss=0.004088
pass 96/280 batch 36/56 train_loss=0.004156
pass 96/280 batch 41/56 train_loss=0.003975
pass 96/280 batch 46/56 train_loss=0.003852
pass 96/280 batch 51/56 train_loss=0.003898 val_loss=0.004182
pass 96/280 batch 56/56 train_loss=0.003990
pass 97/280 batch 1/56 train_loss=0.004174 val_loss=0.004177
pass 97/280 batch 6/56 train_loss=0.003819
pass 97/280 batch 11/56 train_loss=0.003893
pass 97/280 batch 16/56 train_loss=0.004310
pass 97/280 batch 21/56 train_loss=0.003999
pass 97/280 batch 26/56 train_loss=0.003920
pass 97/280 batch 31/56 train_loss=0.003975
pass 97/280 batch 36/56 train_loss=0.004180
pass 97/280 batch 41/56 train_loss=0.003899
pass 97/280 batch 46/56 train_loss=0.003759
pass 97/280 batch 51/56 train_loss=0.004267 val_loss=0.004154
pass 97/280 batch 56/56 train_loss=0.004016
pass 98/280 batch 1/56 train_loss=0.004612 val_loss=0.004150
pass 98/280 batch 6/56 train_loss=0.004153
pass 98/280 batch 11/56 train_loss=0.004268
pass 98/280 batch 16/56 train_loss=0.003981
pass 98/280 batch 21/56 train_loss=0.004435
pass 98/280 batch 26/56 train_loss=0.003873
pass 98/280 batch 31/56 train_loss=0.004075
pass 98/280 batch 36/56 train_loss=0.003806
pass 98/280 batch 41/56 train_loss=0.004053
pass 98/280 batch 46/56 train_loss=0.004031
pass 98/280 batch 51/56 train_loss=0.004085 val_loss=0.004125
pass 98/280 batch 56/56 train_loss=0.004105
pass 99/280 batch 1/56 train_loss=0.004093 val_loss=0.004122
pass 99/280 batch 6/56 train_loss=0.003771
pass 99/280 batch 11/56 train_loss=0.003538
pass 99/280 batch 16/56 train_loss=0.003967
pass 99/280 batch 21/56 train_loss=0.004057
pass 99/280 batch 26/56 train_loss=0.003845
pass 99/280 batch 31/56 train_loss=0.004157
pass 99/280 batch 36/56 train_loss=0.004014
pass 99/280 batch 41/56 train_loss=0.004024
pass 99/280 batch 46/56 train_loss=0.003788
pass 99/280 batch 51/56 train_loss=0.004437 val_loss=0.004098
pass 99/280 batch 56/56 train_loss=0.003975
pass 100/280 batch 1/56 train_loss=0.003829 val_loss=0.004099
pass 100/280 batch 6/56 train_loss=0.003894
pass 100/280 batch 11/56 train_loss=0.003891
pass 100/280 batch 16/56 train_loss=0.003903
pass 100/280 batch 21/56 train_loss=0.004301
pass 100/280 batch 26/56 train_loss=0.004175
pass 100/280 batch 31/56 train_loss=0.003826
pass 100/280 batch 36/56 train_loss=0.004006
pass 100/280 batch 41/56 train_loss=0.004069
pass 100/280 batch 46/56 train_loss=0.003725
pass 100/280 batch 51/56 train_loss=0.003890 val_loss=0.004072
```

```
pass 100/280 batch 56/56 train_loss=0.004054
pass 101/280 batch 1/56 train_loss=0.003886 val_loss=0.004069
pass 101/280 batch 6/56 train_loss=0.004082
pass 101/280 batch 11/56 train_loss=0.004015
pass 101/280 batch 16/56 train_loss=0.003999
pass 101/280 batch 21/56 train_loss=0.004071
pass 101/280 batch 26/56 train_loss=0.004284
pass 101/280 batch 31/56 train_loss=0.004232
pass 101/280 batch 36/56 train_loss=0.003856
pass 101/280 batch 41/56 train_loss=0.003795
pass 101/280 batch 46/56 train_loss=0.003597
pass 101/280 batch 51/56 train_loss=0.003869 val_loss=0.004046
pass 101/280 batch 56/56 train_loss=0.003815
pass 102/280 batch 1/56 train_loss=0.004052 val_loss=0.004041
pass 102/280 batch 6/56 train_loss=0.003928
pass 102/280 batch 11/56 train_loss=0.004223
pass 102/280 batch 16/56 train_loss=0.003771
pass 102/280 batch 21/56 train_loss=0.004022
pass 102/280 batch 26/56 train_loss=0.003883
pass 102/280 batch 31/56 train_loss=0.003959
pass 102/280 batch 36/56 train_loss=0.004182
pass 102/280 batch 41/56 train_loss=0.003805
pass 102/280 batch 46/56 train_loss=0.004359
pass 102/280 batch 51/56 train_loss=0.003785 val_loss=0.004018
pass 102/280 batch 56/56 train_loss=0.003828
pass 103/280 batch 1/56 train_loss=0.004295 val_loss=0.004015
pass 103/280 batch 6/56 train_loss=0.004127
pass 103/280 batch 11/56 train_loss=0.004036
pass 103/280 batch 16/56 train_loss=0.004217
pass 103/280 batch 21/56 train_loss=0.004170
pass 103/280 batch 26/56 train_loss=0.003683
pass 103/280 batch 31/56 train_loss=0.003675
pass 103/280 batch 36/56 train_loss=0.004321
pass 103/280 batch 41/56 train_loss=0.003881
pass 103/280 batch 46/56 train_loss=0.003696
pass 103/280 batch 51/56 train_loss=0.003735 val_loss=0.003995
pass 103/280 batch 56/56 train_loss=0.003785
pass 104/280 batch 1/56 train_loss=0.003819 val_loss=0.003992
pass 104/280 batch 6/56 train_loss=0.004005
pass 104/280 batch 11/56 train_loss=0.003641
pass 104/280 batch 16/56 train_loss=0.003896
pass 104/280 batch 21/56 train_loss=0.003879
pass 104/280 batch 26/56 train_loss=0.004070
pass 104/280 batch 31/56 train_loss=0.004022
pass 104/280 batch 36/56 train_loss=0.004115
pass 104/280 batch 41/56 train_loss=0.003873
pass 104/280 batch 46/56 train_loss=0.003728
pass 104/280 batch 51/56 train_loss=0.003652 val_loss=0.003964
pass 104/280 batch 56/56 train_loss=0.003967
pass 105/280 batch 1/56 train_loss=0.003919 val_loss=0.003961
pass 105/280 batch 6/56 train_loss=0.003747
pass 105/280 batch 11/56 train_loss=0.004142
pass 105/280 batch 16/56 train_loss=0.003635
pass 105/280 batch 21/56 train_loss=0.004122
pass 105/280 batch 26/56 train_loss=0.004050
pass 105/280 batch 31/56 train_loss=0.003721
pass 105/280 batch 36/56 train_loss=0.003939
pass 105/280 batch 41/56 train_loss=0.004060
pass 105/280 batch 46/56 train_loss=0.003853
pass 105/280 batch 51/56 train_loss=0.003632 val_loss=0.003945
```

```
pass 105/280 batch 56/56 train_loss=0.003712
pass 106/280 batch 1/56 train_loss=0.003831 val_loss=0.003936
pass 106/280 batch 6/56 train_loss=0.003808
pass 106/280 batch 11/56 train_loss=0.003900
pass 106/280 batch 16/56 train_loss=0.003867
pass 106/280 batch 21/56 train_loss=0.003855
pass 106/280 batch 26/56 train_loss=0.003965
pass 106/280 batch 31/56 train_loss=0.003843
pass 106/280 batch 36/56 train_loss=0.003740
pass 106/280 batch 41/56 train_loss=0.003798
pass 106/280 batch 46/56 train_loss=0.003731
pass 106/280 batch 51/56 train_loss=0.003876 val_loss=0.003912
pass 106/280 batch 56/56 train_loss=0.004163
pass 107/280 batch 1/56 train_loss=0.004129 val_loss=0.003912
pass 107/280 batch 6/56 train_loss=0.004061
pass 107/280 batch 11/56 train_loss=0.003770
pass 107/280 batch 16/56 train_loss=0.003829
pass 107/280 batch 21/56 train_loss=0.003834
pass 107/280 batch 26/56 train_loss=0.003715
pass 107/280 batch 31/56 train_loss=0.003665
pass 107/280 batch 36/56 train_loss=0.004008
pass 107/280 batch 41/56 train_loss=0.003549
pass 107/280 batch 46/56 train_loss=0.003708
pass 107/280 batch 51/56 train_loss=0.003873 val_loss=0.003887
pass 107/280 batch 56/56 train_loss=0.003721
pass 108/280 batch 1/56 train_loss=0.003605 val_loss=0.003884
pass 108/280 batch 6/56 train_loss=0.004044
pass 108/280 batch 11/56 train_loss=0.003854
pass 108/280 batch 16/56 train_loss=0.004041
pass 108/280 batch 21/56 train_loss=0.003946
pass 108/280 batch 26/56 train_loss=0.003585
pass 108/280 batch 31/56 train_loss=0.003680
pass 108/280 batch 36/56 train_loss=0.003941
pass 108/280 batch 41/56 train_loss=0.003547
pass 108/280 batch 46/56 train_loss=0.003910
pass 108/280 batch 51/56 train_loss=0.003641 val_loss=0.003861
pass 108/280 batch 56/56 train_loss=0.003902
pass 109/280 batch 1/56 train_loss=0.003690 val_loss=0.003860
pass 109/280 batch 6/56 train_loss=0.003764
pass 109/280 batch 11/56 train_loss=0.003739
pass 109/280 batch 16/56 train_loss=0.003742
pass 109/280 batch 21/56 train_loss=0.003640
pass 109/280 batch 26/56 train_loss=0.003849
pass 109/280 batch 31/56 train_loss=0.003363
pass 109/280 batch 36/56 train_loss=0.003861
pass 109/280 batch 41/56 train_loss=0.003850
pass 109/280 batch 46/56 train_loss=0.003830
pass 109/280 batch 51/56 train_loss=0.003476 val_loss=0.003840
pass 109/280 batch 56/56 train_loss=0.003951
pass 110/280 batch 1/56 train_loss=0.003608 val_loss=0.003834
pass 110/280 batch 6/56 train_loss=0.003700
pass 110/280 batch 11/56 train_loss=0.003742
pass 110/280 batch 16/56 train_loss=0.003570
pass 110/280 batch 21/56 train_loss=0.003804
pass 110/280 batch 26/56 train_loss=0.003661
pass 110/280 batch 31/56 train_loss=0.003860
pass 110/280 batch 36/56 train_loss=0.003671
pass 110/280 batch 41/56 train_loss=0.003900
pass 110/280 batch 46/56 train_loss=0.003675
pass 110/280 batch 51/56 train_loss=0.003800 val_loss=0.003812
```

```
pass 110/280 batch 56/56 train_loss=0.003731
pass 111/280 batch 1/56 train_loss=0.003986 val_loss=0.003811
pass 111/280 batch 6/56 train_loss=0.003716
pass 111/280 batch 11/56 train_loss=0.003827
pass 111/280 batch 16/56 train_loss=0.003775
pass 111/280 batch 21/56 train_loss=0.003846
pass 111/280 batch 26/56 train_loss=0.003657
pass 111/280 batch 31/56 train_loss=0.003512
pass 111/280 batch 36/56 train_loss=0.003550
pass 111/280 batch 41/56 train_loss=0.003545
pass 111/280 batch 46/56 train_loss=0.003937
pass 111/280 batch 51/56 train_loss=0.003692 val_loss=0.003789
pass 111/280 batch 56/56 train_loss=0.003538
pass 112/280 batch 1/56 train_loss=0.003656 val_loss=0.003787
pass 112/280 batch 6/56 train_loss=0.003887
pass 112/280 batch 11/56 train_loss=0.003552
pass 112/280 batch 16/56 train_loss=0.003796
pass 112/280 batch 21/56 train_loss=0.003621
pass 112/280 batch 26/56 train_loss=0.003812
pass 112/280 batch 31/56 train_loss=0.003599
pass 112/280 batch 36/56 train_loss=0.003382
pass 112/280 batch 41/56 train_loss=0.003567
pass 112/280 batch 46/56 train_loss=0.003719
pass 112/280 batch 51/56 train_loss=0.003603 val_loss=0.003768
pass 112/280 batch 56/56 train_loss=0.003755
pass 113/280 batch 1/56 train_loss=0.003694 val_loss=0.003761
pass 113/280 batch 6/56 train_loss=0.003634
pass 113/280 batch 11/56 train_loss=0.003966
pass 113/280 batch 16/56 train_loss=0.003720
pass 113/280 batch 21/56 train_loss=0.003560
pass 113/280 batch 26/56 train_loss=0.003848
pass 113/280 batch 31/56 train_loss=0.003639
pass 113/280 batch 36/56 train_loss=0.003614
pass 113/280 batch 41/56 train_loss=0.003627
pass 113/280 batch 46/56 train_loss=0.003790
pass 113/280 batch 51/56 train_loss=0.003547 val_loss=0.003741
pass 113/280 batch 56/56 train_loss=0.003527
pass 114/280 batch 1/56 train_loss=0.003516 val_loss=0.003739
pass 114/280 batch 6/56 train_loss=0.003429
pass 114/280 batch 11/56 train_loss=0.003775
pass 114/280 batch 16/56 train_loss=0.003658
pass 114/280 batch 21/56 train_loss=0.003743
pass 114/280 batch 26/56 train_loss=0.003766
pass 114/280 batch 31/56 train_loss=0.003568
pass 114/280 batch 36/56 train_loss=0.003644
pass 114/280 batch 41/56 train_loss=0.003569
pass 114/280 batch 46/56 train_loss=0.003537
pass 114/280 batch 51/56 train_loss=0.003557 val_loss=0.003717
pass 114/280 batch 56/56 train_loss=0.003431
pass 115/280 batch 1/56 train_loss=0.003685 val_loss=0.003715
pass 115/280 batch 6/56 train_loss=0.003691
pass 115/280 batch 11/56 train_loss=0.003927
pass 115/280 batch 16/56 train_loss=0.003833
pass 115/280 batch 21/56 train_loss=0.003728
pass 115/280 batch 26/56 train_loss=0.003618
pass 115/280 batch 31/56 train_loss=0.003615
pass 115/280 batch 36/56 train_loss=0.003290
pass 115/280 batch 41/56 train_loss=0.003776
pass 115/280 batch 46/56 train_loss=0.003670
pass 115/280 batch 51/56 train_loss=0.003719 val_loss=0.003694
```

```
pass 115/280 batch 56/56 train_loss=0.003640
pass 116/280 batch 1/56 train_loss=0.003762 val_loss=0.003691
pass 116/280 batch 6/56 train_loss=0.003652
pass 116/280 batch 11/56 train_loss=0.003607
pass 116/280 batch 16/56 train_loss=0.003635
pass 116/280 batch 21/56 train_loss=0.003631
pass 116/280 batch 26/56 train_loss=0.003496
pass 116/280 batch 31/56 train_loss=0.003613
pass 116/280 batch 36/56 train_loss=0.003469
pass 116/280 batch 41/56 train_loss=0.003683
pass 116/280 batch 46/56 train_loss=0.003658
pass 116/280 batch 51/56 train_loss=0.003487 val_loss=0.003677
pass 116/280 batch 56/56 train_loss=0.003797
pass 117/280 batch 1/56 train_loss=0.003412 val_loss=0.003672
pass 117/280 batch 6/56 train_loss=0.003480
pass 117/280 batch 11/56 train_loss=0.003750
pass 117/280 batch 16/56 train_loss=0.003772
pass 117/280 batch 21/56 train_loss=0.003494
pass 117/280 batch 26/56 train_loss=0.003347
pass 117/280 batch 31/56 train_loss=0.003818
pass 117/280 batch 36/56 train_loss=0.003850
pass 117/280 batch 41/56 train_loss=0.003542
pass 117/280 batch 46/56 train_loss=0.003695
pass 117/280 batch 51/56 train_loss=0.003718 val_loss=0.003654
pass 117/280 batch 56/56 train_loss=0.003712
pass 118/280 batch 1/56 train_loss=0.003679 val_loss=0.003649
pass 118/280 batch 6/56 train_loss=0.003479
pass 118/280 batch 11/56 train_loss=0.003594
pass 118/280 batch 16/56 train_loss=0.003576
pass 118/280 batch 21/56 train_loss=0.003838
pass 118/280 batch 26/56 train_loss=0.003658
pass 118/280 batch 31/56 train_loss=0.003342
pass 118/280 batch 36/56 train_loss=0.003366
pass 118/280 batch 41/56 train_loss=0.003561
pass 118/280 batch 46/56 train_loss=0.003702
pass 118/280 batch 51/56 train_loss=0.003448 val_loss=0.003627
pass 118/280 batch 56/56 train_loss=0.003357
pass 119/280 batch 1/56 train_loss=0.003372 val_loss=0.003624
pass 119/280 batch 6/56 train_loss=0.003551
pass 119/280 batch 11/56 train_loss=0.003402
pass 119/280 batch 16/56 train_loss=0.003872
pass 119/280 batch 21/56 train_loss=0.003595
pass 119/280 batch 26/56 train_loss=0.003487
pass 119/280 batch 31/56 train_loss=0.003884
pass 119/280 batch 36/56 train_loss=0.003434
pass 119/280 batch 41/56 train_loss=0.003575
pass 119/280 batch 46/56 train_loss=0.003334
pass 119/280 batch 51/56 train_loss=0.003913 val_loss=0.003605
pass 119/280 batch 56/56 train_loss=0.003381
pass 120/280 batch 1/56 train_loss=0.003674 val_loss=0.003612
pass 120/280 batch 6/56 train_loss=0.003593
pass 120/280 batch 11/56 train_loss=0.003508
pass 120/280 batch 16/56 train_loss=0.003202
pass 120/280 batch 21/56 train_loss=0.003738
pass 120/280 batch 26/56 train_loss=0.003458
pass 120/280 batch 31/56 train_loss=0.003382
pass 120/280 batch 36/56 train_loss=0.003539
pass 120/280 batch 41/56 train_loss=0.003422
pass 120/280 batch 46/56 train_loss=0.003372
pass 120/280 batch 51/56 train_loss=0.003588 val_loss=0.003585
```

```
pass 120/280 batch 56/56 train_loss=0.003496
pass 121/280 batch 1/56 train_loss=0.003387 val_loss=0.003584
pass 121/280 batch 6/56 train_loss=0.003459
pass 121/280 batch 11/56 train_loss=0.003562
pass 121/280 batch 16/56 train_loss=0.003495
pass 121/280 batch 21/56 train_loss=0.003234
pass 121/280 batch 26/56 train_loss=0.003271
pass 121/280 batch 31/56 train_loss=0.003645
pass 121/280 batch 36/56 train_loss=0.003455
pass 121/280 batch 41/56 train_loss=0.003440
pass 121/280 batch 46/56 train_loss=0.003234
pass 121/280 batch 51/56 train_loss=0.003330 val_loss=0.003563
pass 121/280 batch 56/56 train_loss=0.003418
pass 122/280 batch 1/56 train_loss=0.003819 val_loss=0.003561
pass 122/280 batch 6/56 train_loss=0.003384
pass 122/280 batch 11/56 train_loss=0.003355
pass 122/280 batch 16/56 train_loss=0.003304
pass 122/280 batch 21/56 train_loss=0.003447
pass 122/280 batch 26/56 train_loss=0.003826
pass 122/280 batch 31/56 train_loss=0.003633
pass 122/280 batch 36/56 train_loss=0.003353
pass 122/280 batch 41/56 train_loss=0.003523
pass 122/280 batch 46/56 train_loss=0.003388
pass 122/280 batch 51/56 train_loss=0.003432 val_loss=0.003546
pass 122/280 batch 56/56 train_loss=0.003379
pass 123/280 batch 1/56 train_loss=0.003352 val_loss=0.003544
pass 123/280 batch 6/56 train_loss=0.003345
pass 123/280 batch 11/56 train_loss=0.003733
pass 123/280 batch 16/56 train_loss=0.003500
pass 123/280 batch 21/56 train_loss=0.003574
pass 123/280 batch 26/56 train_loss=0.003314
pass 123/280 batch 31/56 train_loss=0.003549
pass 123/280 batch 36/56 train_loss=0.003338
pass 123/280 batch 41/56 train_loss=0.003571
pass 123/280 batch 46/56 train_loss=0.003533
pass 123/280 batch 51/56 train_loss=0.003592 val_loss=0.003523
pass 123/280 batch 56/56 train_loss=0.003314
pass 124/280 batch 1/56 train_loss=0.003489 val_loss=0.003527
pass 124/280 batch 6/56 train_loss=0.003442
pass 124/280 batch 11/56 train_loss=0.003335
pass 124/280 batch 16/56 train_loss=0.003622
pass 124/280 batch 21/56 train_loss=0.003463
pass 124/280 batch 26/56 train_loss=0.003462
pass 124/280 batch 31/56 train_loss=0.003687
pass 124/280 batch 36/56 train_loss=0.003201
pass 124/280 batch 41/56 train_loss=0.003438
pass 124/280 batch 46/56 train_loss=0.003639
pass 124/280 batch 51/56 train_loss=0.003499 val_loss=0.003503
pass 124/280 batch 56/56 train_loss=0.003307
pass 125/280 batch 1/56 train_loss=0.003371 val_loss=0.003501
pass 125/280 batch 6/56 train_loss=0.003524
pass 125/280 batch 11/56 train_loss=0.003268
pass 125/280 batch 16/56 train_loss=0.003408
pass 125/280 batch 21/56 train_loss=0.003492
pass 125/280 batch 26/56 train_loss=0.003466
pass 125/280 batch 31/56 train_loss=0.003519
pass 125/280 batch 36/56 train_loss=0.003593
pass 125/280 batch 41/56 train_loss=0.003504
pass 125/280 batch 46/56 train_loss=0.003333
pass 125/280 batch 51/56 train_loss=0.003415 val_loss=0.003484
```

```
pass 125/280 batch 56/56 train_loss=0.003289
pass 126/280 batch 1/56 train_loss=0.003152 val_loss=0.003484
pass 126/280 batch 6/56 train_loss=0.003198
pass 126/280 batch 11/56 train_loss=0.003800
pass 126/280 batch 16/56 train_loss=0.003420
pass 126/280 batch 21/56 train_loss=0.003436
pass 126/280 batch 26/56 train_loss=0.003364
pass 126/280 batch 31/56 train_loss=0.003434
pass 126/280 batch 36/56 train_loss=0.003529
pass 126/280 batch 41/56 train_loss=0.003561
pass 126/280 batch 46/56 train_loss=0.003255
pass 126/280 batch 51/56 train_loss=0.003486 val_loss=0.003465
pass 126/280 batch 56/56 train_loss=0.003417
pass 127/280 batch 1/56 train_loss=0.003333 val_loss=0.003461
pass 127/280 batch 6/56 train_loss=0.003447
pass 127/280 batch 11/56 train_loss=0.003577
pass 127/280 batch 16/56 train_loss=0.003204
pass 127/280 batch 21/56 train_loss=0.003504
pass 127/280 batch 26/56 train_loss=0.003735
pass 127/280 batch 31/56 train_loss=0.003174
pass 127/280 batch 36/56 train_loss=0.003204
pass 127/280 batch 41/56 train_loss=0.003517
pass 127/280 batch 46/56 train_loss=0.003159
pass 127/280 batch 51/56 train_loss=0.003377 val_loss=0.003444
pass 127/280 batch 56/56 train_loss=0.003511
pass 128/280 batch 1/56 train_loss=0.003371 val_loss=0.003453
pass 128/280 batch 6/56 train_loss=0.003237
pass 128/280 batch 11/56 train_loss=0.003368
pass 128/280 batch 16/56 train_loss=0.003345
pass 128/280 batch 21/56 train_loss=0.003341
pass 128/280 batch 26/56 train_loss=0.003491
pass 128/280 batch 31/56 train_loss=0.003244
pass 128/280 batch 36/56 train_loss=0.003379
pass 128/280 batch 41/56 train_loss=0.003560
pass 128/280 batch 46/56 train_loss=0.003484
pass 128/280 batch 51/56 train_loss=0.003506 val_loss=0.003426
pass 128/280 batch 56/56 train_loss=0.003146
pass 129/280 batch 1/56 train_loss=0.003392 val_loss=0.003423
pass 129/280 batch 6/56 train_loss=0.003108
pass 129/280 batch 11/56 train_loss=0.003189
pass 129/280 batch 16/56 train_loss=0.003486
pass 129/280 batch 21/56 train_loss=0.003706
pass 129/280 batch 26/56 train_loss=0.003485
pass 129/280 batch 31/56 train_loss=0.003597
pass 129/280 batch 36/56 train_loss=0.003173
pass 129/280 batch 41/56 train_loss=0.003622
pass 129/280 batch 46/56 train_loss=0.003336
pass 129/280 batch 51/56 train_loss=0.003282 val_loss=0.003407
pass 129/280 batch 56/56 train_loss=0.003453
pass 130/280 batch 1/56 train_loss=0.003337 val_loss=0.003404
pass 130/280 batch 6/56 train_loss=0.003369
pass 130/280 batch 11/56 train_loss=0.003613
pass 130/280 batch 16/56 train_loss=0.003417
pass 130/280 batch 21/56 train_loss=0.003134
pass 130/280 batch 26/56 train_loss=0.003311
pass 130/280 batch 31/56 train_loss=0.003366
pass 130/280 batch 36/56 train_loss=0.003300
pass 130/280 batch 41/56 train_loss=0.003218
pass 130/280 batch 46/56 train_loss=0.003323
pass 130/280 batch 51/56 train_loss=0.003239 val_loss=0.003392
```

```
pass 130/280 batch 56/56 train_loss=0.003503
pass 131/280 batch 1/56 train_loss=0.003457 val_loss=0.003388
pass 131/280 batch 6/56 train_loss=0.003536
pass 131/280 batch 11/56 train_loss=0.003338
pass 131/280 batch 16/56 train_loss=0.003344
pass 131/280 batch 21/56 train_loss=0.003402
pass 131/280 batch 26/56 train_loss=0.003560
pass 131/280 batch 31/56 train_loss=0.003468
pass 131/280 batch 36/56 train_loss=0.003256
pass 131/280 batch 41/56 train_loss=0.003201
pass 131/280 batch 46/56 train_loss=0.003217
pass 131/280 batch 51/56 train_loss=0.003452 val_loss=0.003370
pass 131/280 batch 56/56 train_loss=0.003360
pass 132/280 batch 1/56 train_loss=0.003291 val_loss=0.003368
pass 132/280 batch 6/56 train_loss=0.003239
pass 132/280 batch 11/56 train_loss=0.003187
pass 132/280 batch 16/56 train_loss=0.003407
pass 132/280 batch 21/56 train_loss=0.003254
pass 132/280 batch 26/56 train_loss=0.003399
pass 132/280 batch 31/56 train_loss=0.003321
pass 132/280 batch 36/56 train_loss=0.003298
pass 132/280 batch 41/56 train_loss=0.003259
pass 132/280 batch 46/56 train_loss=0.003604
pass 132/280 batch 51/56 train_loss=0.003366 val_loss=0.003355
pass 132/280 batch 56/56 train_loss=0.003599
pass 133/280 batch 1/56 train_loss=0.003358 val_loss=0.003351
pass 133/280 batch 6/56 train_loss=0.003163
pass 133/280 batch 11/56 train_loss=0.003307
pass 133/280 batch 16/56 train_loss=0.003215
pass 133/280 batch 21/56 train_loss=0.003292
pass 133/280 batch 26/56 train_loss=0.003211
pass 133/280 batch 31/56 train_loss=0.003518
pass 133/280 batch 36/56 train_loss=0.003183
pass 133/280 batch 41/56 train_loss=0.003257
pass 133/280 batch 46/56 train_loss=0.003518
pass 133/280 batch 51/56 train_loss=0.003207 val_loss=0.003338
pass 133/280 batch 56/56 train_loss=0.003063
pass 134/280 batch 1/56 train_loss=0.003244 val_loss=0.003333
pass 134/280 batch 6/56 train_loss=0.003398
pass 134/280 batch 11/56 train_loss=0.003238
pass 134/280 batch 16/56 train_loss=0.003317
pass 134/280 batch 21/56 train_loss=0.003254
pass 134/280 batch 26/56 train_loss=0.003273
pass 134/280 batch 31/56 train_loss=0.003069
pass 134/280 batch 36/56 train_loss=0.003564
pass 134/280 batch 41/56 train_loss=0.003222
pass 134/280 batch 46/56 train_loss=0.003052
pass 134/280 batch 51/56 train_loss=0.003218 val_loss=0.003317
pass 134/280 batch 56/56 train_loss=0.003361
pass 135/280 batch 1/56 train_loss=0.003005 val_loss=0.003315
pass 135/280 batch 6/56 train_loss=0.003453
pass 135/280 batch 11/56 train_loss=0.003300
pass 135/280 batch 16/56 train_loss=0.003135
pass 135/280 batch 21/56 train_loss=0.003312
pass 135/280 batch 26/56 train_loss=0.003459
pass 135/280 batch 31/56 train_loss=0.003145
pass 135/280 batch 36/56 train_loss=0.003050
pass 135/280 batch 41/56 train_loss=0.003084
pass 135/280 batch 46/56 train_loss=0.003301
pass 135/280 batch 51/56 train_loss=0.003541 val_loss=0.003300
```

```
pass 135/280 batch 56/56 train_loss=0.003171
pass 136/280 batch 1/56 train_loss=0.003060 val_loss=0.003299
pass 136/280 batch 6/56 train_loss=0.003610
pass 136/280 batch 11/56 train_loss=0.003488
pass 136/280 batch 16/56 train_loss=0.003325
pass 136/280 batch 21/56 train_loss=0.003190
pass 136/280 batch 26/56 train_loss=0.003447
pass 136/280 batch 31/56 train_loss=0.003127
pass 136/280 batch 36/56 train_loss=0.003490
pass 136/280 batch 41/56 train_loss=0.003527
pass 136/280 batch 46/56 train_loss=0.003102
pass 136/280 batch 51/56 train_loss=0.003178 val_loss=0.003284
pass 136/280 batch 56/56 train_loss=0.003099
pass 137/280 batch 1/56 train_loss=0.003185 val_loss=0.003285
pass 137/280 batch 6/56 train_loss=0.003313
pass 137/280 batch 11/56 train_loss=0.003307
pass 137/280 batch 16/56 train_loss=0.003217
pass 137/280 batch 21/56 train_loss=0.003234
pass 137/280 batch 26/56 train_loss=0.003170
pass 137/280 batch 31/56 train_loss=0.003179
pass 137/280 batch 36/56 train_loss=0.003303
pass 137/280 batch 41/56 train_loss=0.003127
pass 137/280 batch 46/56 train_loss=0.003296
pass 137/280 batch 51/56 train_loss=0.003213 val_loss=0.003267
pass 137/280 batch 56/56 train_loss=0.003295
pass 138/280 batch 1/56 train_loss=0.003144 val_loss=0.003265
pass 138/280 batch 6/56 train_loss=0.003098
pass 138/280 batch 11/56 train_loss=0.003126
pass 138/280 batch 16/56 train_loss=0.003244
pass 138/280 batch 21/56 train_loss=0.003218
pass 138/280 batch 26/56 train_loss=0.003083
pass 138/280 batch 31/56 train_loss=0.003118
pass 138/280 batch 36/56 train_loss=0.003206
pass 138/280 batch 41/56 train_loss=0.003323
pass 138/280 batch 46/56 train_loss=0.003255
pass 138/280 batch 51/56 train_loss=0.003333 val_loss=0.003253
pass 138/280 batch 56/56 train_loss=0.003134
pass 139/280 batch 1/56 train_loss=0.003230 val_loss=0.003249
pass 139/280 batch 6/56 train_loss=0.002977
pass 139/280 batch 11/56 train_loss=0.002970
pass 139/280 batch 16/56 train_loss=0.003220
pass 139/280 batch 21/56 train_loss=0.003237
pass 139/280 batch 26/56 train_loss=0.003338
pass 139/280 batch 31/56 train_loss=0.003300
pass 139/280 batch 36/56 train_loss=0.003129
pass 139/280 batch 41/56 train_loss=0.003015
pass 139/280 batch 46/56 train_loss=0.003040
pass 139/280 batch 51/56 train_loss=0.003071 val_loss=0.003236
pass 139/280 batch 56/56 train_loss=0.003332
pass 140/280 batch 1/56 train_loss=0.003378 val_loss=0.003231
pass 140/280 batch 6/56 train_loss=0.003329
pass 140/280 batch 11/56 train_loss=0.002940
pass 140/280 batch 16/56 train_loss=0.003109
pass 140/280 batch 21/56 train_loss=0.003167
pass 140/280 batch 26/56 train_loss=0.003061
pass 140/280 batch 31/56 train_loss=0.002985
pass 140/280 batch 36/56 train_loss=0.003148
pass 140/280 batch 41/56 train_loss=0.002985
pass 140/280 batch 46/56 train_loss=0.003303
pass 140/280 batch 51/56 train_loss=0.003395 val_loss=0.003224
```

```
pass 140/280 batch 56/56 train_loss=0.003051
pass 141/280 batch 1/56 train_loss=0.003014 val_loss=0.003216
pass 141/280 batch 6/56 train_loss=0.003072
pass 141/280 batch 11/56 train_loss=0.003220
pass 141/280 batch 16/56 train_loss=0.002820
pass 141/280 batch 21/56 train_loss=0.003009
pass 141/280 batch 26/56 train_loss=0.003094
pass 141/280 batch 31/56 train_loss=0.003104
pass 141/280 batch 36/56 train_loss=0.002896
pass 141/280 batch 41/56 train_loss=0.003059
pass 141/280 batch 46/56 train_loss=0.003021
pass 141/280 batch 51/56 train_loss=0.003232 val_loss=0.003202
pass 141/280 batch 56/56 train_loss=0.003179
pass 142/280 batch 1/56 train_loss=0.003184 val_loss=0.003200
pass 142/280 batch 6/56 train_loss=0.003221
pass 142/280 batch 11/56 train_loss=0.003185
pass 142/280 batch 16/56 train_loss=0.003370
pass 142/280 batch 21/56 train_loss=0.003338
pass 142/280 batch 26/56 train_loss=0.003062
pass 142/280 batch 31/56 train_loss=0.003060
pass 142/280 batch 36/56 train_loss=0.003257
pass 142/280 batch 41/56 train_loss=0.003093
pass 142/280 batch 46/56 train_loss=0.003179
pass 142/280 batch 51/56 train_loss=0.003019 val_loss=0.003185
pass 142/280 batch 56/56 train_loss=0.003162
pass 143/280 batch 1/56 train_loss=0.003190 val_loss=0.003184
pass 143/280 batch 6/56 train_loss=0.002922
pass 143/280 batch 11/56 train_loss=0.003257
pass 143/280 batch 16/56 train_loss=0.003166
pass 143/280 batch 21/56 train_loss=0.003295
pass 143/280 batch 26/56 train_loss=0.003053
pass 143/280 batch 31/56 train_loss=0.003237
pass 143/280 batch 36/56 train_loss=0.002952
pass 143/280 batch 41/56 train_loss=0.003073
pass 143/280 batch 46/56 train_loss=0.003115
pass 143/280 batch 51/56 train_loss=0.002994 val_loss=0.003170
pass 143/280 batch 56/56 train_loss=0.002950
pass 144/280 batch 1/56 train_loss=0.003201 val_loss=0.003170
pass 144/280 batch 6/56 train_loss=0.002905
pass 144/280 batch 11/56 train_loss=0.003093
pass 144/280 batch 16/56 train_loss=0.003043
pass 144/280 batch 21/56 train_loss=0.002983
pass 144/280 batch 26/56 train_loss=0.002986
pass 144/280 batch 31/56 train_loss=0.003021
pass 144/280 batch 36/56 train_loss=0.003367
pass 144/280 batch 41/56 train_loss=0.003111
pass 144/280 batch 46/56 train_loss=0.003088
pass 144/280 batch 51/56 train_loss=0.003364 val_loss=0.003154
pass 144/280 batch 56/56 train_loss=0.002949
pass 145/280 batch 1/56 train_loss=0.003048 val_loss=0.003153
pass 145/280 batch 6/56 train_loss=0.002839
pass 145/280 batch 11/56 train_loss=0.003297
pass 145/280 batch 16/56 train_loss=0.002968
pass 145/280 batch 21/56 train_loss=0.003153
pass 145/280 batch 26/56 train_loss=0.002927
pass 145/280 batch 31/56 train_loss=0.003071
pass 145/280 batch 36/56 train_loss=0.002984
pass 145/280 batch 41/56 train_loss=0.003133
pass 145/280 batch 46/56 train_loss=0.003361
pass 145/280 batch 51/56 train_loss=0.003003 val_loss=0.003139
```

```
pass 145/280 batch 56/56 train_loss=0.003013
pass 146/280 batch 1/56 train_loss=0.003088 val_loss=0.003142
pass 146/280 batch 6/56 train_loss=0.003116
pass 146/280 batch 11/56 train_loss=0.003062
pass 146/280 batch 16/56 train_loss=0.003106
pass 146/280 batch 21/56 train_loss=0.003168
pass 146/280 batch 26/56 train_loss=0.002840
pass 146/280 batch 31/56 train_loss=0.002892
pass 146/280 batch 36/56 train_loss=0.003043
pass 146/280 batch 41/56 train_loss=0.003345
pass 146/280 batch 46/56 train_loss=0.003450
pass 146/280 batch 51/56 train_loss=0.003217 val_loss=0.003124
pass 146/280 batch 56/56 train_loss=0.003182
pass 147/280 batch 1/56 train_loss=0.003026 val_loss=0.003124
pass 147/280 batch 6/56 train_loss=0.003336
pass 147/280 batch 11/56 train_loss=0.002965
pass 147/280 batch 16/56 train_loss=0.003010
pass 147/280 batch 21/56 train_loss=0.002988
pass 147/280 batch 26/56 train_loss=0.003058
pass 147/280 batch 31/56 train_loss=0.003044
pass 147/280 batch 36/56 train_loss=0.002941
pass 147/280 batch 41/56 train_loss=0.003324
pass 147/280 batch 46/56 train_loss=0.002856
pass 147/280 batch 51/56 train_loss=0.003371 val_loss=0.003110
pass 147/280 batch 56/56 train_loss=0.003191
pass 148/280 batch 1/56 train_loss=0.003076 val_loss=0.003110
pass 148/280 batch 6/56 train_loss=0.003062
pass 148/280 batch 11/56 train_loss=0.003003
pass 148/280 batch 16/56 train_loss=0.003212
pass 148/280 batch 21/56 train_loss=0.002889
pass 148/280 batch 26/56 train_loss=0.003012
pass 148/280 batch 31/56 train_loss=0.002916
pass 148/280 batch 36/56 train_loss=0.003012
pass 148/280 batch 41/56 train_loss=0.002962
pass 148/280 batch 46/56 train_loss=0.003156
pass 148/280 batch 51/56 train_loss=0.003024 val_loss=0.003098
pass 148/280 batch 56/56 train_loss=0.002862
pass 149/280 batch 1/56 train_loss=0.002975 val_loss=0.003098
pass 149/280 batch 6/56 train_loss=0.002974
pass 149/280 batch 11/56 train_loss=0.003054
pass 149/280 batch 16/56 train_loss=0.003148
pass 149/280 batch 21/56 train_loss=0.003036
pass 149/280 batch 26/56 train_loss=0.003384
pass 149/280 batch 31/56 train_loss=0.003103
pass 149/280 batch 36/56 train_loss=0.002964
pass 149/280 batch 41/56 train_loss=0.003005
pass 149/280 batch 46/56 train_loss=0.003007
pass 149/280 batch 51/56 train_loss=0.002720 val_loss=0.003081
pass 149/280 batch 56/56 train_loss=0.002997
pass 150/280 batch 1/56 train_loss=0.002703 val_loss=0.003080
pass 150/280 batch 6/56 train_loss=0.003040
pass 150/280 batch 11/56 train_loss=0.003237
pass 150/280 batch 16/56 train_loss=0.003001
pass 150/280 batch 21/56 train_loss=0.003060
pass 150/280 batch 26/56 train_loss=0.003059
pass 150/280 batch 31/56 train_loss=0.002824
pass 150/280 batch 36/56 train_loss=0.002946
pass 150/280 batch 41/56 train_loss=0.002964
pass 150/280 batch 46/56 train_loss=0.003012
pass 150/280 batch 51/56 train_loss=0.003050 val_loss=0.003066
```

```
pass 150/280 batch 56/56 train_loss=0.002782
pass 151/280 batch 1/56 train_loss=0.003171 val_loss=0.003064
pass 151/280 batch 6/56 train_loss=0.003262
pass 151/280 batch 11/56 train_loss=0.003163
pass 151/280 batch 16/56 train_loss=0.002964
pass 151/280 batch 21/56 train_loss=0.002878
pass 151/280 batch 26/56 train_loss=0.003170
pass 151/280 batch 31/56 train_loss=0.003186
pass 151/280 batch 36/56 train_loss=0.003107
pass 151/280 batch 41/56 train_loss=0.002851
pass 151/280 batch 46/56 train_loss=0.003019
pass 151/280 batch 51/56 train_loss=0.002895 val_loss=0.003052
pass 151/280 batch 56/56 train_loss=0.002834
pass 152/280 batch 1/56 train_loss=0.002772 val_loss=0.003056
pass 152/280 batch 6/56 train_loss=0.003033
pass 152/280 batch 11/56 train_loss=0.003034
pass 152/280 batch 16/56 train_loss=0.002924
pass 152/280 batch 21/56 train_loss=0.003029
pass 152/280 batch 26/56 train_loss=0.002949
pass 152/280 batch 31/56 train_loss=0.002923
pass 152/280 batch 36/56 train_loss=0.002855
pass 152/280 batch 41/56 train_loss=0.002832
pass 152/280 batch 46/56 train_loss=0.002911
pass 152/280 batch 51/56 train_loss=0.003047 val_loss=0.003038
pass 152/280 batch 56/56 train_loss=0.003240
pass 153/280 batch 1/56 train_loss=0.003032 val_loss=0.003036
pass 153/280 batch 6/56 train_loss=0.002990
pass 153/280 batch 11/56 train_loss=0.003151
pass 153/280 batch 16/56 train_loss=0.002786
pass 153/280 batch 21/56 train_loss=0.003205
pass 153/280 batch 26/56 train_loss=0.002843
pass 153/280 batch 31/56 train_loss=0.002877
pass 153/280 batch 36/56 train_loss=0.002948
pass 153/280 batch 41/56 train_loss=0.002864
pass 153/280 batch 46/56 train_loss=0.003201
pass 153/280 batch 51/56 train_loss=0.002712 val_loss=0.003024
pass 153/280 batch 56/56 train_loss=0.003196
pass 154/280 batch 1/56 train_loss=0.003054 val_loss=0.003023
pass 154/280 batch 6/56 train_loss=0.002906
pass 154/280 batch 11/56 train_loss=0.003024
pass 154/280 batch 16/56 train_loss=0.002958
pass 154/280 batch 21/56 train_loss=0.003202
pass 154/280 batch 26/56 train_loss=0.002871
pass 154/280 batch 31/56 train_loss=0.002948
pass 154/280 batch 36/56 train_loss=0.003116
pass 154/280 batch 41/56 train_loss=0.002983
pass 154/280 batch 46/56 train_loss=0.002941
pass 154/280 batch 51/56 train_loss=0.003051 val_loss=0.003013
pass 154/280 batch 56/56 train_loss=0.003090
pass 155/280 batch 1/56 train_loss=0.002794 val_loss=0.003010
pass 155/280 batch 6/56 train_loss=0.002829
pass 155/280 batch 11/56 train_loss=0.003029
pass 155/280 batch 16/56 train_loss=0.002953
pass 155/280 batch 21/56 train_loss=0.002966
pass 155/280 batch 26/56 train_loss=0.003050
pass 155/280 batch 31/56 train_loss=0.003138
pass 155/280 batch 36/56 train_loss=0.002896
pass 155/280 batch 41/56 train_loss=0.002874
pass 155/280 batch 46/56 train_loss=0.002932
pass 155/280 batch 51/56 train_loss=0.002905 val_loss=0.002999
```

```
pass 155/280 batch 56/56 train_loss=0.002985
pass 156/280 batch 1/56 train_loss=0.003208 val_loss=0.002995
pass 156/280 batch 6/56 train_loss=0.003071
pass 156/280 batch 11/56 train_loss=0.002724
pass 156/280 batch 16/56 train_loss=0.003034
pass 156/280 batch 21/56 train_loss=0.002695
pass 156/280 batch 26/56 train_loss=0.002981
pass 156/280 batch 31/56 train_loss=0.002887
pass 156/280 batch 36/56 train_loss=0.003008
pass 156/280 batch 41/56 train_loss=0.002826
pass 156/280 batch 46/56 train_loss=0.002988
pass 156/280 batch 51/56 train_loss=0.002942 val_loss=0.002984
pass 156/280 batch 56/56 train_loss=0.002891
pass 157/280 batch 1/56 train_loss=0.002877 val_loss=0.002982
pass 157/280 batch 6/56 train_loss=0.002760
pass 157/280 batch 11/56 train_loss=0.002982
pass 157/280 batch 16/56 train_loss=0.002775
pass 157/280 batch 21/56 train_loss=0.002621
pass 157/280 batch 26/56 train_loss=0.003019
pass 157/280 batch 31/56 train_loss=0.002819
pass 157/280 batch 36/56 train_loss=0.002940
pass 157/280 batch 41/56 train_loss=0.002915
pass 157/280 batch 46/56 train_loss=0.003142
pass 157/280 batch 51/56 train_loss=0.003003 val_loss=0.002970
pass 157/280 batch 56/56 train_loss=0.002890
pass 158/280 batch 1/56 train_loss=0.002764 val_loss=0.002969
pass 158/280 batch 6/56 train_loss=0.003262
pass 158/280 batch 11/56 train_loss=0.003054
pass 158/280 batch 16/56 train_loss=0.002910
pass 158/280 batch 21/56 train_loss=0.003017
pass 158/280 batch 26/56 train_loss=0.002960
pass 158/280 batch 31/56 train_loss=0.002673
pass 158/280 batch 36/56 train_loss=0.002866
pass 158/280 batch 41/56 train_loss=0.003074
pass 158/280 batch 46/56 train_loss=0.002874
pass 158/280 batch 51/56 train_loss=0.002857 val_loss=0.002957
pass 158/280 batch 56/56 train_loss=0.002897
pass 159/280 batch 1/56 train_loss=0.002752 val_loss=0.002957
pass 159/280 batch 6/56 train_loss=0.002690
pass 159/280 batch 11/56 train_loss=0.002896
pass 159/280 batch 16/56 train_loss=0.002821
pass 159/280 batch 21/56 train_loss=0.003100
pass 159/280 batch 26/56 train_loss=0.002994
pass 159/280 batch 31/56 train_loss=0.003169
pass 159/280 batch 36/56 train_loss=0.002814
pass 159/280 batch 41/56 train_loss=0.002783
pass 159/280 batch 46/56 train_loss=0.002820
pass 159/280 batch 51/56 train_loss=0.003216 val_loss=0.002944
pass 159/280 batch 56/56 train_loss=0.002892
pass 160/280 batch 1/56 train_loss=0.002848 val_loss=0.002942
pass 160/280 batch 6/56 train_loss=0.002811
pass 160/280 batch 11/56 train_loss=0.002881
pass 160/280 batch 16/56 train_loss=0.002762
pass 160/280 batch 21/56 train_loss=0.003019
pass 160/280 batch 26/56 train_loss=0.002710
pass 160/280 batch 31/56 train_loss=0.003011
pass 160/280 batch 36/56 train_loss=0.002894
pass 160/280 batch 41/56 train_loss=0.003097
pass 160/280 batch 46/56 train_loss=0.002901
pass 160/280 batch 51/56 train_loss=0.002932 val_loss=0.002931
```

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pass 160/280 batch 56/56 train_loss=0.002833
pass 161/280 batch 1/56 train_loss=0.002735 val_loss=0.002931
pass 161/280 batch 6/56 train_loss=0.002816
pass 161/280 batch 11/56 train_loss=0.002934
pass 161/280 batch 16/56 train_loss=0.002799
pass 161/280 batch 21/56 train_loss=0.002950
pass 161/280 batch 26/56 train_loss=0.002898
pass 161/280 batch 31/56 train_loss=0.002918
pass 161/280 batch 36/56 train_loss=0.002970
pass 161/280 batch 41/56 train_loss=0.003050
pass 161/280 batch 46/56 train_loss=0.002981
pass 161/280 batch 51/56 train_loss=0.002910 val_loss=0.002918
pass 161/280 batch 56/56 train_loss=0.002865
pass 162/280 batch 1/56 train_loss=0.002879 val_loss=0.002917
pass 162/280 batch 6/56 train_loss=0.002848
pass 162/280 batch 11/56 train_loss=0.002881
pass 162/280 batch 16/56 train_loss=0.002825
pass 162/280 batch 21/56 train_loss=0.002914
pass 162/280 batch 26/56 train_loss=0.002880
pass 162/280 batch 31/56 train_loss=0.003095
pass 162/280 batch 36/56 train_loss=0.002834
pass 162/280 batch 41/56 train_loss=0.002849
pass 162/280 batch 46/56 train_loss=0.002922
pass 162/280 batch 51/56 train_loss=0.003019 val_loss=0.002906
pass 162/280 batch 56/56 train_loss=0.002772
pass 163/280 batch 1/56 train_loss=0.002776 val_loss=0.002904
pass 163/280 batch 6/56 train_loss=0.002952
pass 163/280 batch 11/56 train_loss=0.002850
pass 163/280 batch 16/56 train_loss=0.002805
pass 163/280 batch 21/56 train_loss=0.002857
pass 163/280 batch 26/56 train_loss=0.002729
pass 163/280 batch 31/56 train_loss=0.002696
pass 163/280 batch 36/56 train_loss=0.002572
pass 163/280 batch 41/56 train_loss=0.003001
pass 163/280 batch 46/56 train_loss=0.002860
pass 163/280 batch 51/56 train_loss=0.002895 val_loss=0.002894
pass 163/280 batch 56/56 train_loss=0.003067
pass 164/280 batch 1/56 train_loss=0.002860 val_loss=0.002892
pass 164/280 batch 6/56 train_loss=0.002701
pass 164/280 batch 11/56 train_loss=0.002895
pass 164/280 batch 16/56 train_loss=0.002983
pass 164/280 batch 21/56 train_loss=0.002949
pass 164/280 batch 26/56 train_loss=0.002879
pass 164/280 batch 31/56 train_loss=0.002756
pass 164/280 batch 36/56 train_loss=0.002790
pass 164/280 batch 41/56 train_loss=0.002684
pass 164/280 batch 46/56 train_loss=0.002822
pass 164/280 batch 51/56 train_loss=0.002834 val_loss=0.002883
pass 164/280 batch 56/56 train_loss=0.002872
pass 165/280 batch 1/56 train_loss=0.002889 val_loss=0.002880
pass 165/280 batch 6/56 train_loss=0.002799
pass 165/280 batch 11/56 train_loss=0.002788
pass 165/280 batch 16/56 train_loss=0.002878
pass 165/280 batch 21/56 train_loss=0.002813
pass 165/280 batch 26/56 train_loss=0.003141
pass 165/280 batch 31/56 train_loss=0.002774
pass 165/280 batch 36/56 train_loss=0.002673
pass 165/280 batch 41/56 train_loss=0.002668
pass 165/280 batch 46/56 train_loss=0.002942
pass 165/280 batch 51/56 train_loss=0.002631 val_loss=0.002877
```

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pass 165/280 batch 56/56 train_loss=0.002984
pass 166/280 batch 1/56 train_loss=0.002707 val_loss=0.002877
pass 166/280 batch 6/56 train_loss=0.002694
pass 166/280 batch 11/56 train_loss=0.002766
pass 166/280 batch 16/56 train_loss=0.002712
pass 166/280 batch 21/56 train_loss=0.002598
pass 166/280 batch 26/56 train_loss=0.003103
pass 166/280 batch 31/56 train_loss=0.002762
pass 166/280 batch 36/56 train_loss=0.002984
pass 166/280 batch 41/56 train_loss=0.002886
pass 166/280 batch 46/56 train_loss=0.002546
pass 166/280 batch 51/56 train_loss=0.002804 val_loss=0.002858
pass 166/280 batch 56/56 train_loss=0.002871
pass 167/280 batch 1/56 train_loss=0.002890 val_loss=0.002855
pass 167/280 batch 6/56 train_loss=0.002794
pass 167/280 batch 11/56 train_loss=0.002789
pass 167/280 batch 16/56 train_loss=0.002615
pass 167/280 batch 21/56 train_loss=0.002668
pass 167/280 batch 26/56 train_loss=0.002850
pass 167/280 batch 31/56 train_loss=0.002824
pass 167/280 batch 36/56 train_loss=0.002959
pass 167/280 batch 41/56 train_loss=0.002942
pass 167/280 batch 46/56 train_loss=0.002865
pass 167/280 batch 51/56 train_loss=0.002831 val_loss=0.002844
pass 167/280 batch 56/56 train_loss=0.002514
pass 168/280 batch 1/56 train_loss=0.002621 val_loss=0.002843
pass 168/280 batch 6/56 train_loss=0.002767
pass 168/280 batch 11/56 train_loss=0.002730
pass 168/280 batch 16/56 train_loss=0.002781
pass 168/280 batch 21/56 train_loss=0.003048
pass 168/280 batch 26/56 train_loss=0.002939
pass 168/280 batch 31/56 train_loss=0.002804
pass 168/280 batch 36/56 train_loss=0.002995
pass 168/280 batch 41/56 train_loss=0.002768
pass 168/280 batch 46/56 train_loss=0.002691
pass 168/280 batch 51/56 train_loss=0.002839 val_loss=0.002833
pass 168/280 batch 56/56 train_loss=0.002731
pass 169/280 batch 1/56 train_loss=0.002837 val_loss=0.002833
pass 169/280 batch 6/56 train_loss=0.002819
pass 169/280 batch 11/56 train_loss=0.002814
pass 169/280 batch 16/56 train_loss=0.002899
pass 169/280 batch 21/56 train_loss=0.002688
pass 169/280 batch 26/56 train_loss=0.002535
pass 169/280 batch 31/56 train_loss=0.002612
pass 169/280 batch 36/56 train_loss=0.002738
pass 169/280 batch 41/56 train_loss=0.002600
pass 169/280 batch 46/56 train_loss=0.002941
pass 169/280 batch 51/56 train_loss=0.002645 val_loss=0.002822
pass 169/280 batch 56/56 train_loss=0.002846
pass 170/280 batch 1/56 train_loss=0.002915 val_loss=0.002821
pass 170/280 batch 6/56 train_loss=0.002789
pass 170/280 batch 11/56 train_loss=0.002555
pass 170/280 batch 16/56 train_loss=0.002661
pass 170/280 batch 21/56 train_loss=0.002700
pass 170/280 batch 26/56 train_loss=0.002856
pass 170/280 batch 31/56 train_loss=0.002611
pass 170/280 batch 36/56 train_loss=0.002815
pass 170/280 batch 41/56 train_loss=0.002861
pass 170/280 batch 46/56 train_loss=0.002603
pass 170/280 batch 51/56 train_loss=0.002598 val_loss=0.002811
```

```
pass 170/280 batch 56/56 train_loss=0.002844
pass 171/280 batch 1/56 train_loss=0.002761 val_loss=0.002809
pass 171/280 batch 6/56 train_loss=0.002696
pass 171/280 batch 11/56 train_loss=0.002620
pass 171/280 batch 16/56 train_loss=0.002695
pass 171/280 batch 21/56 train_loss=0.002821
pass 171/280 batch 26/56 train_loss=0.002830
pass 171/280 batch 31/56 train_loss=0.002783
pass 171/280 batch 36/56 train_loss=0.002585
pass 171/280 batch 41/56 train_loss=0.002478
pass 171/280 batch 46/56 train_loss=0.002762
pass 171/280 batch 51/56 train_loss=0.002668 val_loss=0.002799
pass 171/280 batch 56/56 train_loss=0.002912
pass 172/280 batch 1/56 train_loss=0.002786 val_loss=0.002797
pass 172/280 batch 6/56 train_loss=0.002685
pass 172/280 batch 11/56 train_loss=0.002579
pass 172/280 batch 16/56 train_loss=0.002816
pass 172/280 batch 21/56 train_loss=0.002887
pass 172/280 batch 26/56 train_loss=0.002762
pass 172/280 batch 31/56 train_loss=0.003033
pass 172/280 batch 36/56 train_loss=0.002683
pass 172/280 batch 41/56 train_loss=0.002632
pass 172/280 batch 46/56 train_loss=0.002470
pass 172/280 batch 51/56 train_loss=0.002750 val_loss=0.002787
pass 172/280 batch 56/56 train_loss=0.002845
pass 173/280 batch 1/56 train_loss=0.002570 val_loss=0.002786
pass 173/280 batch 6/56 train_loss=0.002808
pass 173/280 batch 11/56 train_loss=0.002757
pass 173/280 batch 16/56 train_loss=0.002698
pass 173/280 batch 21/56 train_loss=0.002729
pass 173/280 batch 26/56 train_loss=0.002648
pass 173/280 batch 31/56 train_loss=0.002609
pass 173/280 batch 36/56 train_loss=0.002802
pass 173/280 batch 41/56 train_loss=0.002699
pass 173/280 batch 46/56 train_loss=0.002890
pass 173/280 batch 51/56 train_loss=0.002745 val_loss=0.002776
pass 173/280 batch 56/56 train_loss=0.002695
pass 174/280 batch 1/56 train_loss=0.002640 val_loss=0.002775
pass 174/280 batch 6/56 train_loss=0.002560
pass 174/280 batch 11/56 train_loss=0.002698
pass 174/280 batch 16/56 train_loss=0.002586
pass 174/280 batch 21/56 train_loss=0.002764
pass 174/280 batch 26/56 train_loss=0.002786
pass 174/280 batch 31/56 train_loss=0.002768
pass 174/280 batch 36/56 train_loss=0.002577
pass 174/280 batch 41/56 train_loss=0.002900
pass 174/280 batch 46/56 train_loss=0.002803
pass 174/280 batch 51/56 train_loss=0.002460 val_loss=0.002766
pass 174/280 batch 56/56 train_loss=0.002723
pass 175/280 batch 1/56 train_loss=0.002774 val_loss=0.002763
pass 175/280 batch 6/56 train_loss=0.002759
pass 175/280 batch 11/56 train_loss=0.002799
pass 175/280 batch 16/56 train_loss=0.002709
pass 175/280 batch 21/56 train_loss=0.002714
pass 175/280 batch 26/56 train_loss=0.002733
pass 175/280 batch 31/56 train_loss=0.002649
pass 175/280 batch 36/56 train_loss=0.002718
pass 175/280 batch 41/56 train_loss=0.002656
pass 175/280 batch 46/56 train_loss=0.002769
pass 175/280 batch 51/56 train_loss=0.002701 val_loss=0.002757
```

```
pass 175/280 batch 56/56 train_loss=0.002779
pass 176/280 batch 1/56 train_loss=0.002683 val_loss=0.002753
pass 176/280 batch 6/56 train_loss=0.002578
pass 176/280 batch 11/56 train_loss=0.002855
pass 176/280 batch 16/56 train_loss=0.002621
pass 176/280 batch 21/56 train_loss=0.002841
pass 176/280 batch 26/56 train_loss=0.002850
pass 176/280 batch 31/56 train_loss=0.002560
pass 176/280 batch 36/56 train_loss=0.002721
pass 176/280 batch 41/56 train_loss=0.002679
pass 176/280 batch 46/56 train_loss=0.002540
pass 176/280 batch 51/56 train_loss=0.002618 val_loss=0.002743
pass 176/280 batch 56/56 train_loss=0.002765
pass 177/280 batch 1/56 train_loss=0.002765 val_loss=0.002745
pass 177/280 batch 6/56 train_loss=0.002555
pass 177/280 batch 11/56 train_loss=0.002792
pass 177/280 batch 16/56 train_loss=0.002601
pass 177/280 batch 21/56 train_loss=0.002618
pass 177/280 batch 26/56 train_loss=0.002671
pass 177/280 batch 31/56 train_loss=0.002730
pass 177/280 batch 36/56 train_loss=0.002934
pass 177/280 batch 41/56 train_loss=0.002473
pass 177/280 batch 46/56 train_loss=0.002792
pass 177/280 batch 51/56 train_loss=0.002666 val_loss=0.002740
pass 177/280 batch 56/56 train_loss=0.002630
pass 178/280 batch 1/56 train_loss=0.002544 val_loss=0.002735
pass 178/280 batch 6/56 train_loss=0.002744
pass 178/280 batch 11/56 train_loss=0.002655
pass 178/280 batch 16/56 train_loss=0.002594
pass 178/280 batch 21/56 train_loss=0.002568
pass 178/280 batch 26/56 train_loss=0.002941
pass 178/280 batch 31/56 train_loss=0.002541
pass 178/280 batch 36/56 train_loss=0.002639
pass 178/280 batch 41/56 train_loss=0.002681
pass 178/280 batch 46/56 train_loss=0.002688
pass 178/280 batch 51/56 train_loss=0.002724 val_loss=0.002721
pass 178/280 batch 56/56 train_loss=0.002642
pass 179/280 batch 1/56 train_loss=0.002662 val_loss=0.002721
pass 179/280 batch 6/56 train_loss=0.002727
pass 179/280 batch 11/56 train_loss=0.002784
pass 179/280 batch 16/56 train_loss=0.002682
pass 179/280 batch 21/56 train_loss=0.002455
pass 179/280 batch 26/56 train_loss=0.002706
pass 179/280 batch 31/56 train_loss=0.002682
pass 179/280 batch 36/56 train_loss=0.002565
pass 179/280 batch 41/56 train_loss=0.002427
pass 179/280 batch 46/56 train_loss=0.002792
pass 179/280 batch 51/56 train_loss=0.002634 val_loss=0.002710
pass 179/280 batch 56/56 train_loss=0.002712
pass 180/280 batch 1/56 train_loss=0.002488 val_loss=0.002713
pass 180/280 batch 6/56 train_loss=0.002838
pass 180/280 batch 11/56 train_loss=0.002853
pass 180/280 batch 16/56 train_loss=0.002945
pass 180/280 batch 21/56 train_loss=0.002684
pass 180/280 batch 26/56 train_loss=0.002489
pass 180/280 batch 31/56 train_loss=0.002726
pass 180/280 batch 36/56 train_loss=0.002638
pass 180/280 batch 41/56 train_loss=0.002665
pass 180/280 batch 46/56 train_loss=0.002761
pass 180/280 batch 51/56 train_loss=0.002578 val_loss=0.002700
```

```
pass 180/280 batch 56/56 train_loss=0.002622
pass 181/280 batch 1/56 train_loss=0.002423 val_loss=0.002701
pass 181/280 batch 6/56 train_loss=0.002714
pass 181/280 batch 11/56 train_loss=0.002678
pass 181/280 batch 16/56 train_loss=0.002688
pass 181/280 batch 21/56 train_loss=0.002641
pass 181/280 batch 26/56 train_loss=0.002644
pass 181/280 batch 31/56 train_loss=0.002583
pass 181/280 batch 36/56 train_loss=0.002604
pass 181/280 batch 41/56 train_loss=0.002617
pass 181/280 batch 46/56 train_loss=0.002755
pass 181/280 batch 51/56 train_loss=0.002702 val_loss=0.002693
pass 181/280 batch 56/56 train_loss=0.002479
pass 182/280 batch 1/56 train_loss=0.002652 val_loss=0.002688
pass 182/280 batch 6/56 train_loss=0.002699
pass 182/280 batch 11/56 train_loss=0.002548
pass 182/280 batch 16/56 train_loss=0.002617
pass 182/280 batch 21/56 train_loss=0.002668
pass 182/280 batch 26/56 train_loss=0.002790
pass 182/280 batch 31/56 train_loss=0.002516
pass 182/280 batch 36/56 train_loss=0.002728
pass 182/280 batch 41/56 train_loss=0.002684
pass 182/280 batch 46/56 train_loss=0.002501
pass 182/280 batch 51/56 train_loss=0.002598 val_loss=0.002685
pass 182/280 batch 56/56 train_loss=0.002765
pass 183/280 batch 1/56 train_loss=0.002513 val_loss=0.002680
pass 183/280 batch 6/56 train_loss=0.002734
pass 183/280 batch 11/56 train_loss=0.002456
pass 183/280 batch 16/56 train_loss=0.002805
pass 183/280 batch 21/56 train_loss=0.002529
pass 183/280 batch 26/56 train_loss=0.002700
pass 183/280 batch 31/56 train_loss=0.002645
pass 183/280 batch 36/56 train_loss=0.002607
pass 183/280 batch 41/56 train_loss=0.002495
pass 183/280 batch 46/56 train_loss=0.002738
pass 183/280 batch 51/56 train_loss=0.002595 val_loss=0.002670
pass 183/280 batch 56/56 train_loss=0.002654
pass 184/280 batch 1/56 train_loss=0.002551 val_loss=0.002671
pass 184/280 batch 6/56 train_loss=0.002521
pass 184/280 batch 11/56 train_loss=0.002618
pass 184/280 batch 16/56 train_loss=0.002575
pass 184/280 batch 21/56 train_loss=0.002512
pass 184/280 batch 26/56 train_loss=0.002632
pass 184/280 batch 31/56 train_loss=0.002569
pass 184/280 batch 36/56 train_loss=0.002683
pass 184/280 batch 41/56 train_loss=0.002476
pass 184/280 batch 46/56 train_loss=0.002547
pass 184/280 batch 51/56 train_loss=0.002575 val_loss=0.002664
pass 184/280 batch 56/56 train_loss=0.002610
pass 185/280 batch 1/56 train_loss=0.002699 val_loss=0.002660
pass 185/280 batch 6/56 train_loss=0.002607
pass 185/280 batch 11/56 train_loss=0.002556
pass 185/280 batch 16/56 train_loss=0.002404
pass 185/280 batch 21/56 train_loss=0.002589
pass 185/280 batch 26/56 train_loss=0.002551
pass 185/280 batch 31/56 train_loss=0.002578
pass 185/280 batch 36/56 train_loss=0.002510
pass 185/280 batch 41/56 train_loss=0.002467
pass 185/280 batch 46/56 train_loss=0.002620
pass 185/280 batch 51/56 train_loss=0.002647 val_loss=0.002650
```

```
pass 185/280 batch 56/56 train_loss=0.002894
pass 186/280 batch 1/56 train_loss=0.002677 val_loss=0.002648
pass 186/280 batch 6/56 train_loss=0.002713
pass 186/280 batch 11/56 train_loss=0.002544
pass 186/280 batch 16/56 train_loss=0.002671
pass 186/280 batch 21/56 train_loss=0.002537
pass 186/280 batch 26/56 train_loss=0.002807
pass 186/280 batch 31/56 train_loss=0.002491
pass 186/280 batch 36/56 train_loss=0.002867
pass 186/280 batch 41/56 train_loss=0.002745
pass 186/280 batch 46/56 train_loss=0.002550
pass 186/280 batch 51/56 train_loss=0.002457 val_loss=0.002640
pass 186/280 batch 56/56 train_loss=0.002867
pass 187/280 batch 1/56 train_loss=0.002531 val_loss=0.002638
pass 187/280 batch 6/56 train_loss=0.002689
pass 187/280 batch 11/56 train_loss=0.002738
pass 187/280 batch 16/56 train_loss=0.002337
pass 187/280 batch 21/56 train_loss=0.002504
pass 187/280 batch 26/56 train_loss=0.002634
pass 187/280 batch 31/56 train_loss=0.002528
pass 187/280 batch 36/56 train_loss=0.002335
pass 187/280 batch 41/56 train_loss=0.002611
pass 187/280 batch 46/56 train_loss=0.002646
pass 187/280 batch 51/56 train_loss=0.002528 val_loss=0.002629
pass 187/280 batch 56/56 train_loss=0.002646
pass 188/280 batch 1/56 train_loss=0.002590 val_loss=0.002628
pass 188/280 batch 6/56 train_loss=0.002590
pass 188/280 batch 11/56 train_loss=0.002546
pass 188/280 batch 16/56 train_loss=0.002442
pass 188/280 batch 21/56 train_loss=0.002532
pass 188/280 batch 26/56 train_loss=0.002680
pass 188/280 batch 31/56 train_loss=0.002655
pass 188/280 batch 36/56 train_loss=0.002392
pass 188/280 batch 41/56 train_loss=0.002510
pass 188/280 batch 46/56 train_loss=0.002595
pass 188/280 batch 51/56 train_loss=0.002500 val_loss=0.002620
pass 188/280 batch 56/56 train_loss=0.002742
pass 189/280 batch 1/56 train_loss=0.002513 val_loss=0.002620
pass 189/280 batch 6/56 train_loss=0.002516
pass 189/280 batch 11/56 train_loss=0.002675
pass 189/280 batch 16/56 train_loss=0.002414
pass 189/280 batch 21/56 train_loss=0.002600
pass 189/280 batch 26/56 train_loss=0.002605
pass 189/280 batch 31/56 train_loss=0.002436
pass 189/280 batch 36/56 train_loss=0.002530
pass 189/280 batch 41/56 train_loss=0.002533
pass 189/280 batch 46/56 train_loss=0.002494
pass 189/280 batch 51/56 train_loss=0.002687 val_loss=0.002610
pass 189/280 batch 56/56 train_loss=0.002704
pass 190/280 batch 1/56 train_loss=0.002654 val_loss=0.002610
pass 190/280 batch 6/56 train_loss=0.002614
pass 190/280 batch 11/56 train_loss=0.002546
pass 190/280 batch 16/56 train_loss=0.002634
pass 190/280 batch 21/56 train_loss=0.002551
pass 190/280 batch 26/56 train_loss=0.002571
pass 190/280 batch 31/56 train_loss=0.002426
pass 190/280 batch 36/56 train_loss=0.002711
pass 190/280 batch 41/56 train_loss=0.002490
pass 190/280 batch 46/56 train_loss=0.002695
pass 190/280 batch 51/56 train_loss=0.002671 val_loss=0.002600
```

```
pass 190/280 batch 56/56 train_loss=0.002672
pass 191/280 batch 1/56 train_loss=0.002445 val_loss=0.002599
pass 191/280 batch 6/56 train_loss=0.002484
pass 191/280 batch 11/56 train_loss=0.002501
pass 191/280 batch 16/56 train_loss=0.002619
pass 191/280 batch 21/56 train_loss=0.002462
pass 191/280 batch 26/56 train_loss=0.002645
pass 191/280 batch 31/56 train_loss=0.002510
pass 191/280 batch 36/56 train_loss=0.002711
pass 191/280 batch 41/56 train_loss=0.002505
pass 191/280 batch 46/56 train_loss=0.002353
pass 191/280 batch 51/56 train_loss=0.002529 val_loss=0.002593
pass 191/280 batch 56/56 train_loss=0.002592
pass 192/280 batch 1/56 train_loss=0.002634 val_loss=0.002590
pass 192/280 batch 6/56 train_loss=0.002627
pass 192/280 batch 11/56 train_loss=0.002484
pass 192/280 batch 16/56 train_loss=0.002466
pass 192/280 batch 21/56 train_loss=0.002574
pass 192/280 batch 26/56 train_loss=0.002553
pass 192/280 batch 31/56 train_loss=0.002522
pass 192/280 batch 36/56 train_loss=0.002582
pass 192/280 batch 41/56 train_loss=0.002411
pass 192/280 batch 46/56 train_loss=0.002452
pass 192/280 batch 51/56 train_loss=0.002393 val_loss=0.002583
pass 192/280 batch 56/56 train_loss=0.002433
pass 193/280 batch 1/56 train_loss=0.002470 val_loss=0.002584
pass 193/280 batch 6/56 train_loss=0.002574
pass 193/280 batch 11/56 train_loss=0.002585
pass 193/280 batch 16/56 train_loss=0.002666
pass 193/280 batch 21/56 train_loss=0.002581
pass 193/280 batch 26/56 train_loss=0.002584
pass 193/280 batch 31/56 train_loss=0.002588
pass 193/280 batch 36/56 train_loss=0.002568
pass 193/280 batch 41/56 train_loss=0.002564
pass 193/280 batch 46/56 train_loss=0.002493
pass 193/280 batch 51/56 train_loss=0.002422 val_loss=0.002573
pass 193/280 batch 56/56 train_loss=0.002460
pass 194/280 batch 1/56 train_loss=0.002496 val_loss=0.002571
pass 194/280 batch 6/56 train_loss=0.002479
pass 194/280 batch 11/56 train_loss=0.002529
pass 194/280 batch 16/56 train_loss=0.002540
pass 194/280 batch 21/56 train_loss=0.002442
pass 194/280 batch 26/56 train_loss=0.002569
pass 194/280 batch 31/56 train_loss=0.002613
pass 194/280 batch 36/56 train_loss=0.002528
pass 194/280 batch 41/56 train_loss=0.002614
pass 194/280 batch 46/56 train_loss=0.002470
pass 194/280 batch 51/56 train_loss=0.002596 val_loss=0.002564
pass 194/280 batch 56/56 train_loss=0.002493
pass 195/280 batch 1/56 train_loss=0.002538 val_loss=0.002562
pass 195/280 batch 6/56 train_loss=0.002785
pass 195/280 batch 11/56 train_loss=0.002369
pass 195/280 batch 16/56 train_loss=0.002398
pass 195/280 batch 21/56 train_loss=0.002466
pass 195/280 batch 26/56 train_loss=0.002528
pass 195/280 batch 31/56 train_loss=0.002411
pass 195/280 batch 36/56 train_loss=0.002434
pass 195/280 batch 41/56 train_loss=0.002446
pass 195/280 batch 46/56 train_loss=0.002740
pass 195/280 batch 51/56 train_loss=0.002389 val_loss=0.002557
```

```
pass 195/280 batch 56/56 train_loss=0.002526
pass 196/280 batch 1/56 train_loss=0.002529 val_loss=0.002555
pass 196/280 batch 6/56 train_loss=0.002572
pass 196/280 batch 11/56 train_loss=0.002400
pass 196/280 batch 16/56 train_loss=0.002593
pass 196/280 batch 21/56 train_loss=0.002613
pass 196/280 batch 26/56 train_loss=0.002582
pass 196/280 batch 31/56 train_loss=0.002384
pass 196/280 batch 36/56 train_loss=0.002576
pass 196/280 batch 41/56 train_loss=0.002265
pass 196/280 batch 46/56 train_loss=0.002658
pass 196/280 batch 51/56 train_loss=0.002475 val_loss=0.002546
pass 196/280 batch 56/56 train_loss=0.002448
pass 197/280 batch 1/56 train_loss=0.002495 val_loss=0.002544
pass 197/280 batch 6/56 train_loss=0.002476
pass 197/280 batch 11/56 train_loss=0.002609
pass 197/280 batch 16/56 train_loss=0.002355
pass 197/280 batch 21/56 train_loss=0.002337
pass 197/280 batch 26/56 train_loss=0.002428
pass 197/280 batch 31/56 train_loss=0.002371
pass 197/280 batch 36/56 train_loss=0.002539
pass 197/280 batch 41/56 train_loss=0.002544
pass 197/280 batch 46/56 train_loss=0.002470
pass 197/280 batch 51/56 train_loss=0.002430 val_loss=0.002536
pass 197/280 batch 56/56 train_loss=0.002299
pass 198/280 batch 1/56 train_loss=0.002416 val_loss=0.002535
pass 198/280 batch 6/56 train_loss=0.002407
pass 198/280 batch 11/56 train_loss=0.002226
pass 198/280 batch 16/56 train_loss=0.002406
pass 198/280 batch 21/56 train_loss=0.002367
pass 198/280 batch 26/56 train_loss=0.002696
pass 198/280 batch 31/56 train_loss=0.002457
pass 198/280 batch 36/56 train_loss=0.002458
pass 198/280 batch 41/56 train_loss=0.002604
pass 198/280 batch 46/56 train_loss=0.002448
pass 198/280 batch 51/56 train_loss=0.002603 val_loss=0.002527
pass 198/280 batch 56/56 train_loss=0.002500
pass 199/280 batch 1/56 train_loss=0.002546 val_loss=0.002527
pass 199/280 batch 6/56 train_loss=0.002396
pass 199/280 batch 11/56 train_loss=0.002743
pass 199/280 batch 16/56 train_loss=0.002446
pass 199/280 batch 21/56 train_loss=0.002392
pass 199/280 batch 26/56 train_loss=0.002712
pass 199/280 batch 31/56 train_loss=0.002458
pass 199/280 batch 36/56 train_loss=0.002565
pass 199/280 batch 41/56 train_loss=0.002533
pass 199/280 batch 46/56 train_loss=0.002834
pass 199/280 batch 51/56 train_loss=0.002416 val_loss=0.002519
pass 199/280 batch 56/56 train_loss=0.002327
pass 200/280 batch 1/56 train_loss=0.002519 val_loss=0.002518
pass 200/280 batch 6/56 train_loss=0.002449
pass 200/280 batch 11/56 train_loss=0.002457
pass 200/280 batch 16/56 train_loss=0.002323
pass 200/280 batch 21/56 train_loss=0.002437
pass 200/280 batch 26/56 train_loss=0.002572
pass 200/280 batch 31/56 train_loss=0.002565
pass 200/280 batch 36/56 train_loss=0.002289
pass 200/280 batch 41/56 train_loss=0.002280
pass 200/280 batch 46/56 train_loss=0.002349
pass 200/280 batch 51/56 train_loss=0.002477 val_loss=0.002510
```

```
pass 200/280 batch 56/56 train_loss=0.002568
pass 201/280 batch 1/56 train_loss=0.002579 val_loss=0.002509
pass 201/280 batch 6/56 train_loss=0.002640
pass 201/280 batch 11/56 train_loss=0.002505
pass 201/280 batch 16/56 train_loss=0.002609
pass 201/280 batch 21/56 train_loss=0.002455
pass 201/280 batch 26/56 train_loss=0.002529
pass 201/280 batch 31/56 train_loss=0.002458
pass 201/280 batch 36/56 train_loss=0.002392
pass 201/280 batch 41/56 train_loss=0.002277
pass 201/280 batch 46/56 train_loss=0.002408
pass 201/280 batch 51/56 train_loss=0.002241 val_loss=0.002501
pass 201/280 batch 56/56 train_loss=0.002452
pass 202/280 batch 1/56 train_loss=0.002415 val_loss=0.002503
pass 202/280 batch 6/56 train_loss=0.002433
pass 202/280 batch 11/56 train_loss=0.002399
pass 202/280 batch 16/56 train_loss=0.002230
pass 202/280 batch 21/56 train_loss=0.002176
pass 202/280 batch 26/56 train_loss=0.002694
pass 202/280 batch 31/56 train_loss=0.002268
pass 202/280 batch 36/56 train_loss=0.002567
pass 202/280 batch 41/56 train_loss=0.002453
pass 202/280 batch 46/56 train_loss=0.002428
pass 202/280 batch 51/56 train_loss=0.002488 val_loss=0.002492
pass 202/280 batch 56/56 train_loss=0.002558
pass 203/280 batch 1/56 train_loss=0.002222 val_loss=0.002494
pass 203/280 batch 6/56 train_loss=0.002291
pass 203/280 batch 11/56 train_loss=0.002497
pass 203/280 batch 16/56 train_loss=0.002408
pass 203/280 batch 21/56 train_loss=0.002550
pass 203/280 batch 26/56 train_loss=0.002394
pass 203/280 batch 31/56 train_loss=0.002432
pass 203/280 batch 36/56 train_loss=0.002552
pass 203/280 batch 41/56 train_loss=0.002596
pass 203/280 batch 46/56 train_loss=0.002403
pass 203/280 batch 51/56 train_loss=0.002535 val_loss=0.002483
pass 203/280 batch 56/56 train_loss=0.002326
pass 204/280 batch 1/56 train_loss=0.002427 val_loss=0.002483
pass 204/280 batch 6/56 train_loss=0.002536
pass 204/280 batch 11/56 train_loss=0.002478
pass 204/280 batch 16/56 train_loss=0.002613
pass 204/280 batch 21/56 train_loss=0.002392
pass 204/280 batch 26/56 train_loss=0.002420
pass 204/280 batch 31/56 train_loss=0.002285
pass 204/280 batch 36/56 train_loss=0.002361
pass 204/280 batch 41/56 train_loss=0.002434
pass 204/280 batch 46/56 train_loss=0.002507
pass 204/280 batch 51/56 train_loss=0.002490 val_loss=0.002475
pass 204/280 batch 56/56 train_loss=0.002503
pass 205/280 batch 1/56 train_loss=0.002323 val_loss=0.002475
pass 205/280 batch 6/56 train_loss=0.002397
pass 205/280 batch 11/56 train_loss=0.002478
pass 205/280 batch 16/56 train_loss=0.002349
pass 205/280 batch 21/56 train_loss=0.002330
pass 205/280 batch 26/56 train_loss=0.002416
pass 205/280 batch 31/56 train_loss=0.002377
pass 205/280 batch 36/56 train_loss=0.002479
pass 205/280 batch 41/56 train_loss=0.002461
pass 205/280 batch 46/56 train_loss=0.002489
pass 205/280 batch 51/56 train_loss=0.002526 val_loss=0.002467
```

```
pass 205/280 batch 56/56 train_loss=0.002392
pass 206/280 batch 1/56 train_loss=0.002570 val_loss=0.002469
pass 206/280 batch 6/56 train_loss=0.002413
pass 206/280 batch 11/56 train_loss=0.002355
pass 206/280 batch 16/56 train_loss=0.002556
pass 206/280 batch 21/56 train_loss=0.002415
pass 206/280 batch 26/56 train_loss=0.002393
pass 206/280 batch 31/56 train_loss=0.002327
pass 206/280 batch 36/56 train_loss=0.002656
pass 206/280 batch 41/56 train_loss=0.002572
pass 206/280 batch 46/56 train_loss=0.002376
pass 206/280 batch 51/56 train_loss=0.002381 val_loss=0.002463
pass 206/280 batch 56/56 train_loss=0.002279
pass 207/280 batch 1/56 train_loss=0.002400 val_loss=0.002458
pass 207/280 batch 6/56 train_loss=0.002373
pass 207/280 batch 11/56 train_loss=0.002293
pass 207/280 batch 16/56 train_loss=0.002376
pass 207/280 batch 21/56 train_loss=0.002618
pass 207/280 batch 26/56 train_loss=0.002355
pass 207/280 batch 31/56 train_loss=0.002342
pass 207/280 batch 36/56 train_loss=0.002688
pass 207/280 batch 41/56 train_loss=0.002377
pass 207/280 batch 46/56 train_loss=0.002553
pass 207/280 batch 51/56 train_loss=0.002496 val_loss=0.002451
pass 207/280 batch 56/56 train_loss=0.002414
pass 208/280 batch 1/56 train_loss=0.002352 val_loss=0.002451
pass 208/280 batch 6/56 train_loss=0.002399
pass 208/280 batch 11/56 train_loss=0.002302
pass 208/280 batch 16/56 train_loss=0.002422
pass 208/280 batch 21/56 train_loss=0.002518
pass 208/280 batch 26/56 train_loss=0.002425
pass 208/280 batch 31/56 train_loss=0.002304
pass 208/280 batch 36/56 train_loss=0.002368
pass 208/280 batch 41/56 train_loss=0.002300
pass 208/280 batch 46/56 train_loss=0.002293
pass 208/280 batch 51/56 train_loss=0.002390 val_loss=0.002443
pass 208/280 batch 56/56 train_loss=0.002584
pass 209/280 batch 1/56 train_loss=0.002434 val_loss=0.002441
pass 209/280 batch 6/56 train_loss=0.002252
pass 209/280 batch 11/56 train_loss=0.002462
pass 209/280 batch 16/56 train_loss=0.002211
pass 209/280 batch 21/56 train_loss=0.002267
pass 209/280 batch 26/56 train_loss=0.002301
pass 209/280 batch 31/56 train_loss=0.002423
pass 209/280 batch 36/56 train_loss=0.002395
pass 209/280 batch 41/56 train_loss=0.002403
pass 209/280 batch 46/56 train_loss=0.002230
pass 209/280 batch 51/56 train_loss=0.002433 val_loss=0.002435
pass 209/280 batch 56/56 train_loss=0.002639
pass 210/280 batch 1/56 train_loss=0.002403 val_loss=0.002435
pass 210/280 batch 6/56 train_loss=0.002587
pass 210/280 batch 11/56 train_loss=0.002514
pass 210/280 batch 16/56 train_loss=0.002254
pass 210/280 batch 21/56 train_loss=0.002472
pass 210/280 batch 26/56 train_loss=0.002391
pass 210/280 batch 31/56 train_loss=0.002357
pass 210/280 batch 36/56 train_loss=0.002563
pass 210/280 batch 41/56 train_loss=0.002492
pass 210/280 batch 46/56 train_loss=0.002289
pass 210/280 batch 51/56 train_loss=0.002586 val_loss=0.002428
```

```
pass 210/280 batch 56/56 train_loss=0.002355
pass 211/280 batch 1/56 train_loss=0.002476 val_loss=0.002426
pass 211/280 batch 6/56 train_loss=0.002212
pass 211/280 batch 11/56 train_loss=0.002324
pass 211/280 batch 16/56 train_loss=0.002314
pass 211/280 batch 21/56 train_loss=0.002378
pass 211/280 batch 26/56 train_loss=0.002415
pass 211/280 batch 31/56 train_loss=0.002302
pass 211/280 batch 36/56 train_loss=0.002457
pass 211/280 batch 41/56 train_loss=0.002408
pass 211/280 batch 46/56 train_loss=0.002446
pass 211/280 batch 51/56 train_loss=0.002575 val_loss=0.002419
pass 211/280 batch 56/56 train_loss=0.002192
pass 212/280 batch 1/56 train_loss=0.002422 val_loss=0.002419
pass 212/280 batch 6/56 train_loss=0.002323
pass 212/280 batch 11/56 train_loss=0.002449
pass 212/280 batch 16/56 train_loss=0.002264
pass 212/280 batch 21/56 train_loss=0.002589
pass 212/280 batch 26/56 train_loss=0.002370
pass 212/280 batch 31/56 train_loss=0.002336
pass 212/280 batch 36/56 train_loss=0.002548
pass 212/280 batch 41/56 train_loss=0.002462
pass 212/280 batch 46/56 train_loss=0.002448
pass 212/280 batch 51/56 train_loss=0.002148 val_loss=0.002411
pass 212/280 batch 56/56 train_loss=0.002607
pass 213/280 batch 1/56 train_loss=0.002418 val_loss=0.002411
pass 213/280 batch 6/56 train_loss=0.002419
pass 213/280 batch 11/56 train_loss=0.002558
pass 213/280 batch 16/56 train_loss=0.002257
pass 213/280 batch 21/56 train_loss=0.002049
pass 213/280 batch 26/56 train_loss=0.002438
pass 213/280 batch 31/56 train_loss=0.002089
pass 213/280 batch 36/56 train_loss=0.002518
pass 213/280 batch 41/56 train_loss=0.002284
pass 213/280 batch 46/56 train_loss=0.002437
pass 213/280 batch 51/56 train_loss=0.002292 val_loss=0.002402
pass 213/280 batch 56/56 train_loss=0.002468
pass 214/280 batch 1/56 train_loss=0.002366 val_loss=0.002402
pass 214/280 batch 6/56 train_loss=0.002257
pass 214/280 batch 11/56 train_loss=0.002381
pass 214/280 batch 16/56 train_loss=0.002239
pass 214/280 batch 21/56 train_loss=0.002112
pass 214/280 batch 26/56 train_loss=0.002469
pass 214/280 batch 31/56 train_loss=0.002346
pass 214/280 batch 36/56 train_loss=0.002440
pass 214/280 batch 41/56 train_loss=0.002416
pass 214/280 batch 46/56 train_loss=0.002278
pass 214/280 batch 51/56 train_loss=0.002384 val_loss=0.002398
pass 214/280 batch 56/56 train_loss=0.002400
pass 215/280 batch 1/56 train_loss=0.002430 val_loss=0.002394
pass 215/280 batch 6/56 train_loss=0.002422
pass 215/280 batch 11/56 train_loss=0.002330
pass 215/280 batch 16/56 train_loss=0.002450
pass 215/280 batch 21/56 train_loss=0.002393
pass 215/280 batch 26/56 train_loss=0.002121
pass 215/280 batch 31/56 train_loss=0.002409
pass 215/280 batch 36/56 train_loss=0.002467
pass 215/280 batch 41/56 train_loss=0.002448
pass 215/280 batch 46/56 train_loss=0.002325
pass 215/280 batch 51/56 train_loss=0.002426 val_loss=0.002388
```

```
pass 215/280 batch 56/56 train_loss=0.002241
pass 216/280 batch 1/56 train_loss=0.002564 val_loss=0.002387
pass 216/280 batch 6/56 train_loss=0.002109
pass 216/280 batch 11/56 train_loss=0.002099
pass 216/280 batch 16/56 train_loss=0.002509
pass 216/280 batch 21/56 train_loss=0.002415
pass 216/280 batch 26/56 train_loss=0.002460
pass 216/280 batch 31/56 train_loss=0.002353
pass 216/280 batch 36/56 train_loss=0.002369
pass 216/280 batch 41/56 train_loss=0.002331
pass 216/280 batch 46/56 train_loss=0.002404
pass 216/280 batch 51/56 train_loss=0.002479 val_loss=0.002379
pass 216/280 batch 56/56 train_loss=0.002264
pass 217/280 batch 1/56 train_loss=0.002208 val_loss=0.002380
pass 217/280 batch 6/56 train_loss=0.002360
pass 217/280 batch 11/56 train_loss=0.002287
pass 217/280 batch 16/56 train_loss=0.002427
pass 217/280 batch 21/56 train_loss=0.002568
pass 217/280 batch 26/56 train_loss=0.002179
pass 217/280 batch 31/56 train_loss=0.002258
pass 217/280 batch 36/56 train_loss=0.002254
pass 217/280 batch 41/56 train_loss=0.002456
pass 217/280 batch 46/56 train_loss=0.002214
pass 217/280 batch 51/56 train_loss=0.002333 val_loss=0.002372
pass 217/280 batch 56/56 train_loss=0.002431
pass 218/280 batch 1/56 train_loss=0.002396 val_loss=0.002372
pass 218/280 batch 6/56 train_loss=0.002254
pass 218/280 batch 11/56 train_loss=0.002346
pass 218/280 batch 16/56 train_loss=0.002281
pass 218/280 batch 21/56 train_loss=0.002577
pass 218/280 batch 26/56 train_loss=0.002188
pass 218/280 batch 31/56 train_loss=0.002447
pass 218/280 batch 36/56 train_loss=0.002311
pass 218/280 batch 41/56 train_loss=0.002381
pass 218/280 batch 46/56 train_loss=0.002262
pass 218/280 batch 51/56 train_loss=0.002253 val_loss=0.002364
pass 218/280 batch 56/56 train_loss=0.002292
pass 219/280 batch 1/56 train_loss=0.002415 val_loss=0.002364
pass 219/280 batch 6/56 train_loss=0.002237
pass 219/280 batch 11/56 train_loss=0.002163
pass 219/280 batch 16/56 train_loss=0.002330
pass 219/280 batch 21/56 train_loss=0.002355
pass 219/280 batch 26/56 train_loss=0.002315
pass 219/280 batch 31/56 train_loss=0.002404
pass 219/280 batch 36/56 train_loss=0.002455
pass 219/280 batch 41/56 train_loss=0.002232
pass 219/280 batch 46/56 train_loss=0.002355
pass 219/280 batch 51/56 train_loss=0.002385 val_loss=0.002357
pass 219/280 batch 56/56 train_loss=0.002113
pass 220/280 batch 1/56 train_loss=0.002384 val_loss=0.002357
pass 220/280 batch 6/56 train_loss=0.002245
pass 220/280 batch 11/56 train_loss=0.002323
pass 220/280 batch 16/56 train_loss=0.002105
pass 220/280 batch 21/56 train_loss=0.002225
pass 220/280 batch 26/56 train_loss=0.002461
pass 220/280 batch 31/56 train_loss=0.002430
pass 220/280 batch 36/56 train_loss=0.002397
pass 220/280 batch 41/56 train_loss=0.002384
pass 220/280 batch 46/56 train_loss=0.002148
pass 220/280 batch 51/56 train_loss=0.002431 val_loss=0.002351
```

```
pass 220/280 batch 56/56 train_loss=0.002310
pass 221/280 batch 1/56 train_loss=0.002373 val_loss=0.002359
pass 221/280 batch 6/56 train_loss=0.001932
pass 221/280 batch 11/56 train_loss=0.002258
pass 221/280 batch 16/56 train_loss=0.002386
pass 221/280 batch 21/56 train_loss=0.002212
pass 221/280 batch 26/56 train_loss=0.002350
pass 221/280 batch 31/56 train_loss=0.002361
pass 221/280 batch 36/56 train_loss=0.002202
pass 221/280 batch 41/56 train_loss=0.002428
pass 221/280 batch 46/56 train_loss=0.002269
pass 221/280 batch 51/56 train_loss=0.002533 val_loss=0.002343
pass 221/280 batch 56/56 train_loss=0.002201
pass 222/280 batch 1/56 train_loss=0.002337 val_loss=0.002341
pass 222/280 batch 6/56 train_loss=0.002270
pass 222/280 batch 11/56 train_loss=0.002363
pass 222/280 batch 16/56 train_loss=0.002431
pass 222/280 batch 21/56 train_loss=0.002281
pass 222/280 batch 26/56 train_loss=0.002484
pass 222/280 batch 31/56 train_loss=0.002166
pass 222/280 batch 36/56 train_loss=0.002347
pass 222/280 batch 41/56 train_loss=0.002224
pass 222/280 batch 46/56 train_loss=0.002308
pass 222/280 batch 51/56 train_loss=0.002352 val_loss=0.002336
pass 222/280 batch 56/56 train_loss=0.002218
pass 223/280 batch 1/56 train_loss=0.002226 val_loss=0.002334
pass 223/280 batch 6/56 train_loss=0.002282
pass 223/280 batch 11/56 train_loss=0.002456
pass 223/280 batch 16/56 train_loss=0.002310
pass 223/280 batch 21/56 train_loss=0.002287
pass 223/280 batch 26/56 train_loss=0.002468
pass 223/280 batch 31/56 train_loss=0.002299
pass 223/280 batch 36/56 train_loss=0.002233
pass 223/280 batch 41/56 train_loss=0.002223
pass 223/280 batch 46/56 train_loss=0.002303
pass 223/280 batch 51/56 train_loss=0.002332 val_loss=0.002329
pass 223/280 batch 56/56 train_loss=0.002346
pass 224/280 batch 1/56 train_loss=0.002265 val_loss=0.002327
pass 224/280 batch 6/56 train_loss=0.002110
pass 224/280 batch 11/56 train_loss=0.002472
pass 224/280 batch 16/56 train_loss=0.002260
pass 224/280 batch 21/56 train_loss=0.002349
pass 224/280 batch 26/56 train_loss=0.002229
pass 224/280 batch 31/56 train_loss=0.002433
pass 224/280 batch 36/56 train_loss=0.002387
pass 224/280 batch 41/56 train_loss=0.002380
pass 224/280 batch 46/56 train_loss=0.002224
pass 224/280 batch 51/56 train_loss=0.002059 val_loss=0.002321
pass 224/280 batch 56/56 train_loss=0.002116
pass 225/280 batch 1/56 train_loss=0.002210 val_loss=0.002320
pass 225/280 batch 6/56 train_loss=0.002270
pass 225/280 batch 11/56 train_loss=0.002280
pass 225/280 batch 16/56 train_loss=0.002394
pass 225/280 batch 21/56 train_loss=0.002199
pass 225/280 batch 26/56 train_loss=0.002398
pass 225/280 batch 31/56 train_loss=0.002240
pass 225/280 batch 36/56 train_loss=0.002297
pass 225/280 batch 41/56 train_loss=0.002333
pass 225/280 batch 46/56 train_loss=0.002278
pass 225/280 batch 51/56 train_loss=0.002308 val_loss=0.002318
```

```
pass 225/280 batch 56/56 train_loss=0.002187
pass 226/280 batch 1/56 train_loss=0.002254 val_loss=0.002318
pass 226/280 batch 6/56 train_loss=0.002240
pass 226/280 batch 11/56 train_loss=0.002366
pass 226/280 batch 16/56 train_loss=0.002237
pass 226/280 batch 21/56 train_loss=0.002244
pass 226/280 batch 26/56 train_loss=0.002347
pass 226/280 batch 31/56 train_loss=0.002167
pass 226/280 batch 36/56 train_loss=0.002261
pass 226/280 batch 41/56 train_loss=0.002469
pass 226/280 batch 46/56 train_loss=0.002377
pass 226/280 batch 51/56 train_loss=0.002266 val_loss=0.002309
pass 226/280 batch 56/56 train_loss=0.002244
pass 227/280 batch 1/56 train_loss=0.002171 val_loss=0.002308
pass 227/280 batch 6/56 train_loss=0.002250
pass 227/280 batch 11/56 train_loss=0.002201
pass 227/280 batch 16/56 train_loss=0.002406
pass 227/280 batch 21/56 train_loss=0.002367
pass 227/280 batch 26/56 train_loss=0.002231
pass 227/280 batch 31/56 train_loss=0.002297
pass 227/280 batch 36/56 train_loss=0.002330
pass 227/280 batch 41/56 train_loss=0.002153
pass 227/280 batch 46/56 train_loss=0.002503
pass 227/280 batch 51/56 train_loss=0.002128 val_loss=0.002300
pass 227/280 batch 56/56 train_loss=0.002332
pass 228/280 batch 1/56 train_loss=0.002404 val_loss=0.002299
pass 228/280 batch 6/56 train_loss=0.002344
pass 228/280 batch 11/56 train_loss=0.002366
pass 228/280 batch 16/56 train_loss=0.002259
pass 228/280 batch 21/56 train_loss=0.002257
pass 228/280 batch 26/56 train_loss=0.002309
pass 228/280 batch 31/56 train_loss=0.002272
pass 228/280 batch 36/56 train_loss=0.002158
pass 228/280 batch 41/56 train_loss=0.002456
pass 228/280 batch 46/56 train_loss=0.002050
pass 228/280 batch 51/56 train_loss=0.002408 val_loss=0.002292
pass 228/280 batch 56/56 train_loss=0.002019
pass 229/280 batch 1/56 train_loss=0.002340 val_loss=0.002292
pass 229/280 batch 6/56 train_loss=0.002246
pass 229/280 batch 11/56 train_loss=0.002202
pass 229/280 batch 16/56 train_loss=0.002260
pass 229/280 batch 21/56 train_loss=0.002269
pass 229/280 batch 26/56 train_loss=0.002180
pass 229/280 batch 31/56 train_loss=0.002214
pass 229/280 batch 36/56 train_loss=0.002417
pass 229/280 batch 41/56 train_loss=0.002288
pass 229/280 batch 46/56 train_loss=0.002323
pass 229/280 batch 51/56 train_loss=0.002181 val_loss=0.002285
pass 229/280 batch 56/56 train_loss=0.002236
pass 230/280 batch 1/56 train_loss=0.002219 val_loss=0.002285
pass 230/280 batch 6/56 train_loss=0.002233
pass 230/280 batch 11/56 train_loss=0.002205
pass 230/280 batch 16/56 train_loss=0.002158
pass 230/280 batch 21/56 train_loss=0.002326
pass 230/280 batch 26/56 train_loss=0.002273
pass 230/280 batch 31/56 train_loss=0.002294
pass 230/280 batch 36/56 train_loss=0.002329
pass 230/280 batch 41/56 train_loss=0.002194
pass 230/280 batch 46/56 train_loss=0.002213
pass 230/280 batch 51/56 train_loss=0.002319 val_loss=0.002281
```

```
pass 230/280 batch 56/56 train_loss=0.002376
pass 231/280 batch 1/56 train_loss=0.002189 val_loss=0.002278
pass 231/280 batch 6/56 train_loss=0.002410
pass 231/280 batch 11/56 train_loss=0.002176
pass 231/280 batch 16/56 train_loss=0.002189
pass 231/280 batch 21/56 train_loss=0.002125
pass 231/280 batch 26/56 train_loss=0.002269
pass 231/280 batch 31/56 train_loss=0.002213
pass 231/280 batch 36/56 train_loss=0.002271
pass 231/280 batch 41/56 train_loss=0.002171
pass 231/280 batch 46/56 train_loss=0.002322
pass 231/280 batch 51/56 train_loss=0.002340 val_loss=0.002273
pass 231/280 batch 56/56 train_loss=0.002109
pass 232/280 batch 1/56 train_loss=0.002200 val_loss=0.002273
pass 232/280 batch 6/56 train_loss=0.002373
pass 232/280 batch 11/56 train_loss=0.002260
pass 232/280 batch 16/56 train_loss=0.002183
pass 232/280 batch 21/56 train_loss=0.002424
pass 232/280 batch 26/56 train_loss=0.002329
pass 232/280 batch 31/56 train_loss=0.002113
pass 232/280 batch 36/56 train_loss=0.002270
pass 232/280 batch 41/56 train_loss=0.002186
pass 232/280 batch 46/56 train_loss=0.002216
pass 232/280 batch 51/56 train_loss=0.002350 val_loss=0.002265
pass 232/280 batch 56/56 train_loss=0.002275
pass 233/280 batch 1/56 train_loss=0.002152 val_loss=0.002264
pass 233/280 batch 6/56 train_loss=0.002175
pass 233/280 batch 11/56 train_loss=0.002183
pass 233/280 batch 16/56 train_loss=0.002327
pass 233/280 batch 21/56 train_loss=0.002174
pass 233/280 batch 26/56 train_loss=0.002297
pass 233/280 batch 31/56 train_loss=0.002052
pass 233/280 batch 36/56 train_loss=0.002261
pass 233/280 batch 41/56 train_loss=0.002149
pass 233/280 batch 46/56 train_loss=0.002357
pass 233/280 batch 51/56 train_loss=0.002437 val_loss=0.002259
pass 233/280 batch 56/56 train_loss=0.002071
pass 234/280 batch 1/56 train_loss=0.002112 val_loss=0.002258
pass 234/280 batch 6/56 train_loss=0.002229
pass 234/280 batch 11/56 train_loss=0.002259
pass 234/280 batch 16/56 train_loss=0.002198
pass 234/280 batch 21/56 train_loss=0.002210
pass 234/280 batch 26/56 train_loss=0.002347
pass 234/280 batch 31/56 train_loss=0.002275
pass 234/280 batch 36/56 train_loss=0.002194
pass 234/280 batch 41/56 train_loss=0.002225
pass 234/280 batch 46/56 train_loss=0.002178
pass 234/280 batch 51/56 train_loss=0.002135 val_loss=0.002252
pass 234/280 batch 56/56 train_loss=0.002166
pass 235/280 batch 1/56 train_loss=0.002244 val_loss=0.002251
pass 235/280 batch 6/56 train_loss=0.002326
pass 235/280 batch 11/56 train_loss=0.002113
pass 235/280 batch 16/56 train_loss=0.002276
pass 235/280 batch 21/56 train_loss=0.002197
pass 235/280 batch 26/56 train_loss=0.002192
pass 235/280 batch 31/56 train_loss=0.002444
pass 235/280 batch 36/56 train_loss=0.002199
pass 235/280 batch 41/56 train_loss=0.002271
pass 235/280 batch 46/56 train_loss=0.002232
pass 235/280 batch 51/56 train_loss=0.002392 val_loss=0.002246
```

```
pass 235/280 batch 56/56 train_loss=0.002265
pass 236/280 batch 1/56 train_loss=0.002147 val_loss=0.002244
pass 236/280 batch 6/56 train_loss=0.002062
pass 236/280 batch 11/56 train_loss=0.002354
pass 236/280 batch 16/56 train_loss=0.002354
pass 236/280 batch 21/56 train_loss=0.002073
pass 236/280 batch 26/56 train_loss=0.002152
pass 236/280 batch 31/56 train_loss=0.002237
pass 236/280 batch 36/56 train_loss=0.002364
pass 236/280 batch 41/56 train_loss=0.002299
pass 236/280 batch 46/56 train_loss=0.002397
pass 236/280 batch 51/56 train_loss=0.002117 val_loss=0.002239
pass 236/280 batch 56/56 train_loss=0.002276
pass 237/280 batch 1/56 train_loss=0.002238 val_loss=0.002238
pass 237/280 batch 6/56 train_loss=0.002290
pass 237/280 batch 11/56 train_loss=0.002063
pass 237/280 batch 16/56 train_loss=0.002050
pass 237/280 batch 21/56 train_loss=0.002405
pass 237/280 batch 26/56 train_loss=0.002179
pass 237/280 batch 31/56 train_loss=0.002269
pass 237/280 batch 36/56 train_loss=0.002173
pass 237/280 batch 41/56 train_loss=0.002226
pass 237/280 batch 46/56 train_loss=0.002241
pass 237/280 batch 51/56 train_loss=0.002246 val_loss=0.002233
pass 237/280 batch 56/56 train_loss=0.002080
pass 238/280 batch 1/56 train_loss=0.002207 val_loss=0.002231
pass 238/280 batch 6/56 train_loss=0.001993
pass 238/280 batch 11/56 train_loss=0.002310
pass 238/280 batch 16/56 train_loss=0.002257
pass 238/280 batch 21/56 train_loss=0.002086
pass 238/280 batch 26/56 train_loss=0.002242
pass 238/280 batch 31/56 train_loss=0.002273
pass 238/280 batch 36/56 train_loss=0.002235
pass 238/280 batch 41/56 train_loss=0.002152
pass 238/280 batch 46/56 train_loss=0.002104
pass 238/280 batch 51/56 train_loss=0.002135 val_loss=0.002226
pass 238/280 batch 56/56 train_loss=0.002228
pass 239/280 batch 1/56 train_loss=0.002227 val_loss=0.002225
pass 239/280 batch 6/56 train_loss=0.002313
pass 239/280 batch 11/56 train_loss=0.002179
pass 239/280 batch 16/56 train_loss=0.002176
pass 239/280 batch 21/56 train_loss=0.002200
pass 239/280 batch 26/56 train_loss=0.002243
pass 239/280 batch 31/56 train_loss=0.002141
pass 239/280 batch 36/56 train_loss=0.002113
pass 239/280 batch 41/56 train_loss=0.002166
pass 239/280 batch 46/56 train_loss=0.002204
pass 239/280 batch 51/56 train_loss=0.002301 val_loss=0.002219
pass 239/280 batch 56/56 train_loss=0.002341
pass 240/280 batch 1/56 train_loss=0.002175 val_loss=0.002219
pass 240/280 batch 6/56 train_loss=0.002227
pass 240/280 batch 11/56 train_loss=0.002176
pass 240/280 batch 16/56 train_loss=0.002269
pass 240/280 batch 21/56 train_loss=0.002245
pass 240/280 batch 26/56 train_loss=0.002118
pass 240/280 batch 31/56 train_loss=0.002143
pass 240/280 batch 36/56 train_loss=0.001990
pass 240/280 batch 41/56 train_loss=0.002125
pass 240/280 batch 46/56 train_loss=0.002225
pass 240/280 batch 51/56 train_loss=0.002105 val_loss=0.002213
```

```
pass 240/280 batch 56/56 train_loss=0.002194
pass 241/280 batch 1/56 train_loss=0.002083 val_loss=0.002214
pass 241/280 batch 6/56 train_loss=0.002214
pass 241/280 batch 11/56 train_loss=0.002052
pass 241/280 batch 16/56 train_loss=0.002165
pass 241/280 batch 21/56 train_loss=0.002095
pass 241/280 batch 26/56 train_loss=0.002154
pass 241/280 batch 31/56 train_loss=0.002144
pass 241/280 batch 36/56 train_loss=0.002307
pass 241/280 batch 41/56 train_loss=0.002401
pass 241/280 batch 46/56 train_loss=0.002277
pass 241/280 batch 51/56 train_loss=0.002329 val_loss=0.002206
pass 241/280 batch 56/56 train_loss=0.002041
pass 242/280 batch 1/56 train_loss=0.002118 val_loss=0.002205
pass 242/280 batch 6/56 train_loss=0.002091
pass 242/280 batch 11/56 train_loss=0.002233
pass 242/280 batch 16/56 train_loss=0.002186
pass 242/280 batch 21/56 train_loss=0.002108
pass 242/280 batch 26/56 train_loss=0.002261
pass 242/280 batch 31/56 train_loss=0.002303
pass 242/280 batch 36/56 train_loss=0.002280
pass 242/280 batch 41/56 train_loss=0.002223
pass 242/280 batch 46/56 train_loss=0.002040
pass 242/280 batch 51/56 train_loss=0.002105 val_loss=0.002200
pass 242/280 batch 56/56 train_loss=0.002369
pass 243/280 batch 1/56 train_loss=0.002208 val_loss=0.002199
pass 243/280 batch 6/56 train_loss=0.002219
pass 243/280 batch 11/56 train_loss=0.002042
pass 243/280 batch 16/56 train_loss=0.002138
pass 243/280 batch 21/56 train_loss=0.002199
pass 243/280 batch 26/56 train_loss=0.002206
pass 243/280 batch 31/56 train_loss=0.002223
pass 243/280 batch 36/56 train_loss=0.002116
pass 243/280 batch 41/56 train_loss=0.002112
pass 243/280 batch 46/56 train_loss=0.002210
pass 243/280 batch 51/56 train_loss=0.002126 val_loss=0.002194
pass 243/280 batch 56/56 train_loss=0.002024
pass 244/280 batch 1/56 train_loss=0.002201 val_loss=0.002193
pass 244/280 batch 6/56 train_loss=0.002179
pass 244/280 batch 11/56 train_loss=0.002227
pass 244/280 batch 16/56 train_loss=0.001936
pass 244/280 batch 21/56 train_loss=0.002097
pass 244/280 batch 26/56 train_loss=0.002154
pass 244/280 batch 31/56 train_loss=0.002324
pass 244/280 batch 36/56 train_loss=0.002098
pass 244/280 batch 41/56 train_loss=0.002177
pass 244/280 batch 46/56 train_loss=0.002174
pass 244/280 batch 51/56 train_loss=0.002254 val_loss=0.002187
pass 244/280 batch 56/56 train_loss=0.001959
pass 245/280 batch 1/56 train_loss=0.002066 val_loss=0.002187
pass 245/280 batch 6/56 train_loss=0.002086
pass 245/280 batch 11/56 train_loss=0.002167
pass 245/280 batch 16/56 train_loss=0.002159
pass 245/280 batch 21/56 train_loss=0.002082
pass 245/280 batch 26/56 train_loss=0.002172
pass 245/280 batch 31/56 train_loss=0.001985
pass 245/280 batch 36/56 train_loss=0.002184
pass 245/280 batch 41/56 train_loss=0.002144
pass 245/280 batch 46/56 train_loss=0.002211
pass 245/280 batch 51/56 train_loss=0.002069 val_loss=0.002181
```

```
pass 245/280 batch 56/56 train_loss=0.002189
pass 246/280 batch 1/56 train_loss=0.002112 val_loss=0.002181
pass 246/280 batch 6/56 train_loss=0.002009
pass 246/280 batch 11/56 train_loss=0.002197
pass 246/280 batch 16/56 train_loss=0.002293
pass 246/280 batch 21/56 train_loss=0.002279
pass 246/280 batch 26/56 train_loss=0.002285
pass 246/280 batch 31/56 train_loss=0.002054
pass 246/280 batch 36/56 train_loss=0.002229
pass 246/280 batch 41/56 train_loss=0.001981
pass 246/280 batch 46/56 train_loss=0.001988
pass 246/280 batch 51/56 train_loss=0.002180 val_loss=0.002175
pass 246/280 batch 56/56 train_loss=0.002027
pass 247/280 batch 1/56 train_loss=0.002068 val_loss=0.002175
pass 247/280 batch 6/56 train_loss=0.002089
pass 247/280 batch 11/56 train_loss=0.002201
pass 247/280 batch 16/56 train_loss=0.002145
pass 247/280 batch 21/56 train_loss=0.002061
pass 247/280 batch 26/56 train_loss=0.002070
pass 247/280 batch 31/56 train_loss=0.002043
pass 247/280 batch 36/56 train_loss=0.002186
pass 247/280 batch 41/56 train_loss=0.002080
pass 247/280 batch 46/56 train_loss=0.002014
pass 247/280 batch 51/56 train_loss=0.002176 val_loss=0.002170
pass 247/280 batch 56/56 train_loss=0.002192
pass 248/280 batch 1/56 train_loss=0.002124 val_loss=0.002169
pass 248/280 batch 6/56 train_loss=0.002122
pass 248/280 batch 11/56 train_loss=0.002189
pass 248/280 batch 16/56 train_loss=0.002150
pass 248/280 batch 21/56 train_loss=0.002042
pass 248/280 batch 26/56 train_loss=0.002005
pass 248/280 batch 31/56 train_loss=0.002327
pass 248/280 batch 36/56 train_loss=0.002078
pass 248/280 batch 41/56 train_loss=0.002134
pass 248/280 batch 46/56 train_loss=0.002210
pass 248/280 batch 51/56 train_loss=0.002057 val_loss=0.002166
pass 248/280 batch 56/56 train_loss=0.002310
pass 249/280 batch 1/56 train_loss=0.002166 val_loss=0.002162
pass 249/280 batch 6/56 train_loss=0.002256
pass 249/280 batch 11/56 train_loss=0.002084
pass 249/280 batch 16/56 train_loss=0.002207
pass 249/280 batch 21/56 train_loss=0.002297
pass 249/280 batch 26/56 train_loss=0.002091
pass 249/280 batch 31/56 train_loss=0.002190
pass 249/280 batch 36/56 train_loss=0.002064
pass 249/280 batch 41/56 train_loss=0.002241
pass 249/280 batch 46/56 train_loss=0.002090
pass 249/280 batch 51/56 train_loss=0.002096 val_loss=0.002157
pass 249/280 batch 56/56 train_loss=0.002086
pass 250/280 batch 1/56 train_loss=0.002233 val_loss=0.002157
pass 250/280 batch 6/56 train_loss=0.002234
pass 250/280 batch 11/56 train_loss=0.002105
pass 250/280 batch 16/56 train_loss=0.002276
pass 250/280 batch 21/56 train_loss=0.002064
pass 250/280 batch 26/56 train_loss=0.002164
pass 250/280 batch 31/56 train_loss=0.002174
pass 250/280 batch 36/56 train_loss=0.002021
pass 250/280 batch 41/56 train_loss=0.002090
pass 250/280 batch 46/56 train_loss=0.002040
pass 250/280 batch 51/56 train_loss=0.001956 val_loss=0.002154
```

```
pass 250/280 batch 56/56 train_loss=0.002067
pass 251/280 batch 1/56 train_loss=0.002173 val_loss=0.002152
pass 251/280 batch 6/56 train_loss=0.002068
pass 251/280 batch 11/56 train_loss=0.002096
pass 251/280 batch 16/56 train_loss=0.002061
pass 251/280 batch 21/56 train_loss=0.002094
pass 251/280 batch 26/56 train_loss=0.001988
pass 251/280 batch 31/56 train_loss=0.002211
pass 251/280 batch 36/56 train_loss=0.002193
pass 251/280 batch 41/56 train_loss=0.002157
pass 251/280 batch 46/56 train_loss=0.001972
pass 251/280 batch 51/56 train_loss=0.002228 val_loss=0.002153
pass 251/280 batch 56/56 train_loss=0.002003
pass 252/280 batch 1/56 train_loss=0.002227 val_loss=0.002146
pass 252/280 batch 6/56 train_loss=0.001995
pass 252/280 batch 11/56 train_loss=0.002223
pass 252/280 batch 16/56 train_loss=0.002290
pass 252/280 batch 21/56 train_loss=0.002194
pass 252/280 batch 26/56 train_loss=0.002019
pass 252/280 batch 31/56 train_loss=0.002157
pass 252/280 batch 36/56 train_loss=0.002134
pass 252/280 batch 41/56 train_loss=0.002219
pass 252/280 batch 46/56 train_loss=0.001993
pass 252/280 batch 51/56 train_loss=0.002187 val_loss=0.002139
pass 252/280 batch 56/56 train_loss=0.002086
pass 253/280 batch 1/56 train_loss=0.002104 val_loss=0.002138
pass 253/280 batch 6/56 train_loss=0.002196
pass 253/280 batch 11/56 train_loss=0.002138
pass 253/280 batch 16/56 train_loss=0.002242
pass 253/280 batch 21/56 train_loss=0.002042
pass 253/280 batch 26/56 train_loss=0.002016
pass 253/280 batch 31/56 train_loss=0.002066
pass 253/280 batch 36/56 train_loss=0.002230
pass 253/280 batch 41/56 train_loss=0.002015
pass 253/280 batch 46/56 train_loss=0.001923
pass 253/280 batch 51/56 train_loss=0.002224 val_loss=0.002133
pass 253/280 batch 56/56 train_loss=0.002096
pass 254/280 batch 1/56 train_loss=0.002027 val_loss=0.002134
pass 254/280 batch 6/56 train_loss=0.002027
pass 254/280 batch 11/56 train_loss=0.002060
pass 254/280 batch 16/56 train_loss=0.001948
pass 254/280 batch 21/56 train_loss=0.002150
pass 254/280 batch 26/56 train_loss=0.001978
pass 254/280 batch 31/56 train_loss=0.002137
pass 254/280 batch 36/56 train_loss=0.002136
pass 254/280 batch 41/56 train_loss=0.002090
pass 254/280 batch 46/56 train_loss=0.002172
pass 254/280 batch 51/56 train_loss=0.002234 val_loss=0.002127
pass 254/280 batch 56/56 train_loss=0.002131
pass 255/280 batch 1/56 train_loss=0.002107 val_loss=0.002127
pass 255/280 batch 6/56 train_loss=0.002148
pass 255/280 batch 11/56 train_loss=0.002102
pass 255/280 batch 16/56 train_loss=0.002078
pass 255/280 batch 21/56 train_loss=0.002001
pass 255/280 batch 26/56 train_loss=0.002157
pass 255/280 batch 31/56 train_loss=0.001962
pass 255/280 batch 36/56 train_loss=0.002313
pass 255/280 batch 41/56 train_loss=0.002060
pass 255/280 batch 46/56 train_loss=0.002151
pass 255/280 batch 51/56 train_loss=0.002033 val_loss=0.002121
```

```
pass 255/280 batch 56/56 train_loss=0.002147
pass 256/280 batch 1/56 train_loss=0.002120 val_loss=0.002122
pass 256/280 batch 6/56 train_loss=0.002180
pass 256/280 batch 11/56 train_loss=0.002190
pass 256/280 batch 16/56 train_loss=0.002203
pass 256/280 batch 21/56 train_loss=0.001919
pass 256/280 batch 26/56 train_loss=0.001954
pass 256/280 batch 31/56 train_loss=0.002038
pass 256/280 batch 36/56 train_loss=0.002049
pass 256/280 batch 41/56 train_loss=0.002065
pass 256/280 batch 46/56 train_loss=0.002066
pass 256/280 batch 51/56 train_loss=0.002126 val_loss=0.002116
pass 256/280 batch 56/56 train_loss=0.001979
pass 257/280 batch 1/56 train_loss=0.001983 val_loss=0.002121
pass 257/280 batch 6/56 train_loss=0.002118
pass 257/280 batch 11/56 train_loss=0.002134
pass 257/280 batch 16/56 train_loss=0.002045
pass 257/280 batch 21/56 train_loss=0.002120
pass 257/280 batch 26/56 train_loss=0.002063
pass 257/280 batch 31/56 train_loss=0.002010
pass 257/280 batch 36/56 train_loss=0.001963
pass 257/280 batch 41/56 train_loss=0.002027
pass 257/280 batch 46/56 train_loss=0.002187
pass 257/280 batch 51/56 train_loss=0.002160 val_loss=0.002110
pass 257/280 batch 56/56 train_loss=0.001939
pass 258/280 batch 1/56 train_loss=0.002126 val_loss=0.002113
pass 258/280 batch 6/56 train_loss=0.002217
pass 258/280 batch 11/56 train_loss=0.002011
pass 258/280 batch 16/56 train_loss=0.001950
pass 258/280 batch 21/56 train_loss=0.002157
pass 258/280 batch 26/56 train_loss=0.002205
pass 258/280 batch 31/56 train_loss=0.002226
pass 258/280 batch 36/56 train_loss=0.002017
pass 258/280 batch 41/56 train_loss=0.002044
pass 258/280 batch 46/56 train_loss=0.002079
pass 258/280 batch 51/56 train_loss=0.002064 val_loss=0.002106
pass 258/280 batch 56/56 train_loss=0.002126
pass 259/280 batch 1/56 train_loss=0.002103 val_loss=0.002105
pass 259/280 batch 6/56 train_loss=0.002070
pass 259/280 batch 11/56 train_loss=0.001994
pass 259/280 batch 16/56 train_loss=0.002137
pass 259/280 batch 21/56 train_loss=0.002085
pass 259/280 batch 26/56 train_loss=0.002090
pass 259/280 batch 31/56 train_loss=0.002064
pass 259/280 batch 36/56 train_loss=0.002142
pass 259/280 batch 41/56 train_loss=0.001992
pass 259/280 batch 46/56 train_loss=0.001807
pass 259/280 batch 51/56 train_loss=0.002073 val_loss=0.002099
pass 259/280 batch 56/56 train_loss=0.001976
pass 260/280 batch 1/56 train_loss=0.001800 val_loss=0.002099
pass 260/280 batch 6/56 train_loss=0.001922
pass 260/280 batch 11/56 train_loss=0.001987
pass 260/280 batch 16/56 train_loss=0.002145
pass 260/280 batch 21/56 train_loss=0.002028
pass 260/280 batch 26/56 train_loss=0.002161
pass 260/280 batch 31/56 train_loss=0.002026
pass 260/280 batch 36/56 train_loss=0.002072
pass 260/280 batch 41/56 train_loss=0.002075
pass 260/280 batch 46/56 train_loss=0.002102
pass 260/280 batch 51/56 train_loss=0.002107 val_loss=0.002093
```

```
pass 260/280 batch 56/56 train_loss=0.002026
pass 261/280 batch 1/56 train_loss=0.002061 val_loss=0.002093
pass 261/280 batch 6/56 train_loss=0.002189
pass 261/280 batch 11/56 train_loss=0.002006
pass 261/280 batch 16/56 train_loss=0.002230
pass 261/280 batch 21/56 train_loss=0.002027
pass 261/280 batch 26/56 train_loss=0.002071
pass 261/280 batch 31/56 train_loss=0.002031
pass 261/280 batch 36/56 train_loss=0.001941
pass 261/280 batch 41/56 train_loss=0.002151
pass 261/280 batch 46/56 train_loss=0.002118
pass 261/280 batch 51/56 train_loss=0.001979 val_loss=0.002088
pass 261/280 batch 56/56 train_loss=0.002051
pass 262/280 batch 1/56 train_loss=0.002023 val_loss=0.002087
pass 262/280 batch 6/56 train_loss=0.002341
pass 262/280 batch 11/56 train_loss=0.002105
pass 262/280 batch 16/56 train_loss=0.002028
pass 262/280 batch 21/56 train_loss=0.002131
pass 262/280 batch 26/56 train_loss=0.002069
pass 262/280 batch 31/56 train_loss=0.002014
pass 262/280 batch 36/56 train_loss=0.002039
pass 262/280 batch 41/56 train_loss=0.002003
pass 262/280 batch 46/56 train_loss=0.002015
pass 262/280 batch 51/56 train_loss=0.001903 val_loss=0.002089
pass 262/280 batch 56/56 train_loss=0.002041
pass 263/280 batch 1/56 train_loss=0.002043 val_loss=0.002084
pass 263/280 batch 6/56 train_loss=0.002103
pass 263/280 batch 11/56 train_loss=0.002158
pass 263/280 batch 16/56 train_loss=0.001889
pass 263/280 batch 21/56 train_loss=0.002043
pass 263/280 batch 26/56 train_loss=0.002027
pass 263/280 batch 31/56 train_loss=0.002079
pass 263/280 batch 36/56 train_loss=0.002097
pass 263/280 batch 41/56 train_loss=0.002070
pass 263/280 batch 46/56 train_loss=0.001995
pass 263/280 batch 51/56 train_loss=0.002049 val_loss=0.002077
pass 263/280 batch 56/56 train_loss=0.002234
pass 264/280 batch 1/56 train_loss=0.002107 val_loss=0.002077
pass 264/280 batch 6/56 train_loss=0.001884
pass 264/280 batch 11/56 train_loss=0.002061
pass 264/280 batch 16/56 train_loss=0.001998
pass 264/280 batch 21/56 train_loss=0.002047
pass 264/280 batch 26/56 train_loss=0.001965
pass 264/280 batch 31/56 train_loss=0.002096
pass 264/280 batch 36/56 train_loss=0.002029
pass 264/280 batch 41/56 train_loss=0.001996
pass 264/280 batch 46/56 train_loss=0.002012
pass 264/280 batch 51/56 train_loss=0.001954 val_loss=0.002074
pass 264/280 batch 56/56 train_loss=0.001984
pass 265/280 batch 1/56 train_loss=0.002055 val_loss=0.002070
pass 265/280 batch 6/56 train_loss=0.002191
pass 265/280 batch 11/56 train_loss=0.002020
pass 265/280 batch 16/56 train_loss=0.002082
pass 265/280 batch 21/56 train_loss=0.002044
pass 265/280 batch 26/56 train_loss=0.002015
pass 265/280 batch 31/56 train_loss=0.002175
pass 265/280 batch 36/56 train_loss=0.001975
pass 265/280 batch 41/56 train_loss=0.001937
pass 265/280 batch 46/56 train_loss=0.002019
pass 265/280 batch 51/56 train_loss=0.001825 val_loss=0.002069
```

```
pass 265/280 batch 56/56 train_loss=0.001972
pass 266/280 batch 1/56 train_loss=0.002082 val_loss=0.002067
pass 266/280 batch 6/56 train_loss=0.001916
pass 266/280 batch 11/56 train_loss=0.002287
pass 266/280 batch 16/56 train_loss=0.001938
pass 266/280 batch 21/56 train_loss=0.002027
pass 266/280 batch 26/56 train_loss=0.002127
pass 266/280 batch 31/56 train_loss=0.002050
pass 266/280 batch 36/56 train_loss=0.002159
pass 266/280 batch 41/56 train_loss=0.002078
pass 266/280 batch 46/56 train_loss=0.002058
pass 266/280 batch 51/56 train_loss=0.002141 val_loss=0.002063
pass 266/280 batch 56/56 train_loss=0.002037
pass 267/280 batch 1/56 train_loss=0.001905 val_loss=0.002061
pass 267/280 batch 6/56 train_loss=0.002004
pass 267/280 batch 11/56 train_loss=0.001961
pass 267/280 batch 16/56 train_loss=0.002145
pass 267/280 batch 21/56 train_loss=0.001949
pass 267/280 batch 26/56 train_loss=0.002129
pass 267/280 batch 31/56 train_loss=0.002003
pass 267/280 batch 36/56 train_loss=0.001892
pass 267/280 batch 41/56 train_loss=0.001991
pass 267/280 batch 46/56 train_loss=0.001942
pass 267/280 batch 51/56 train_loss=0.002060 val_loss=0.002056
pass 267/280 batch 56/56 train_loss=0.002033
pass 268/280 batch 1/56 train_loss=0.001978 val_loss=0.002054
pass 268/280 batch 6/56 train_loss=0.002093
pass 268/280 batch 11/56 train_loss=0.002218
pass 268/280 batch 16/56 train_loss=0.002013
pass 268/280 batch 21/56 train_loss=0.001893
pass 268/280 batch 26/56 train_loss=0.002125
pass 268/280 batch 31/56 train_loss=0.002172
pass 268/280 batch 36/56 train_loss=0.002008
pass 268/280 batch 41/56 train_loss=0.001946
pass 268/280 batch 46/56 train_loss=0.002122
pass 268/280 batch 51/56 train_loss=0.001916 val_loss=0.002050
pass 268/280 batch 56/56 train_loss=0.002078
pass 269/280 batch 1/56 train_loss=0.002061 val_loss=0.002049
pass 269/280 batch 6/56 train_loss=0.001893
pass 269/280 batch 11/56 train_loss=0.002080
pass 269/280 batch 16/56 train_loss=0.002072
pass 269/280 batch 21/56 train_loss=0.002056
pass 269/280 batch 26/56 train_loss=0.002092
pass 269/280 batch 31/56 train_loss=0.001970
pass 269/280 batch 36/56 train_loss=0.002108
pass 269/280 batch 41/56 train_loss=0.002030
pass 269/280 batch 46/56 train_loss=0.002032
pass 269/280 batch 51/56 train_loss=0.001974 val_loss=0.002043
pass 269/280 batch 56/56 train_loss=0.002032
pass 270/280 batch 1/56 train_loss=0.002047 val_loss=0.002043
pass 270/280 batch 6/56 train_loss=0.001806
pass 270/280 batch 11/56 train_loss=0.001971
pass 270/280 batch 16/56 train_loss=0.002152
pass 270/280 batch 21/56 train_loss=0.001936
pass 270/280 batch 26/56 train_loss=0.002054
pass 270/280 batch 31/56 train_loss=0.001988
pass 270/280 batch 36/56 train_loss=0.002084
pass 270/280 batch 41/56 train_loss=0.001934
pass 270/280 batch 46/56 train_loss=0.001860
pass 270/280 batch 51/56 train_loss=0.002176 val_loss=0.002039
```

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pass 270/280 batch 56/56 train_loss=0.002113
pass 271/280 batch 1/56 train_loss=0.001921 val_loss=0.002040
pass 271/280 batch 6/56 train_loss=0.001904
pass 271/280 batch 11/56 train_loss=0.002065
pass 271/280 batch 16/56 train_loss=0.002073
pass 271/280 batch 21/56 train_loss=0.001969
pass 271/280 batch 26/56 train_loss=0.002029
pass 271/280 batch 31/56 train_loss=0.002091
pass 271/280 batch 36/56 train_loss=0.001835
pass 271/280 batch 41/56 train_loss=0.002024
pass 271/280 batch 46/56 train_loss=0.002011
pass 271/280 batch 51/56 train_loss=0.001952 val_loss=0.002034
pass 271/280 batch 56/56 train_loss=0.001872
pass 272/280 batch 1/56 train_loss=0.002027 val_loss=0.002034
pass 272/280 batch 6/56 train_loss=0.001939
pass 272/280 batch 11/56 train_loss=0.001998
pass 272/280 batch 16/56 train_loss=0.002108
pass 272/280 batch 21/56 train_loss=0.001893
pass 272/280 batch 26/56 train_loss=0.001898
pass 272/280 batch 31/56 train_loss=0.002045
pass 272/280 batch 36/56 train_loss=0.002142
pass 272/280 batch 41/56 train_loss=0.001949
pass 272/280 batch 46/56 train_loss=0.002085
pass 272/280 batch 51/56 train_loss=0.001895 val_loss=0.002029
pass 272/280 batch 56/56 train_loss=0.002088
pass 273/280 batch 1/56 train_loss=0.001961 val_loss=0.002028
pass 273/280 batch 6/56 train_loss=0.002143
pass 273/280 batch 11/56 train_loss=0.001986
pass 273/280 batch 16/56 train_loss=0.002132
pass 273/280 batch 21/56 train_loss=0.001988
pass 273/280 batch 26/56 train_loss=0.002015
pass 273/280 batch 31/56 train_loss=0.002183
pass 273/280 batch 36/56 train_loss=0.002002
pass 273/280 batch 41/56 train_loss=0.001874
pass 273/280 batch 46/56 train_loss=0.001995
pass 273/280 batch 51/56 train_loss=0.002060 val_loss=0.002023
pass 273/280 batch 56/56 train_loss=0.001973
pass 274/280 batch 1/56 train_loss=0.001835 val_loss=0.002022
pass 274/280 batch 6/56 train_loss=0.001920
pass 274/280 batch 11/56 train_loss=0.002000
pass 274/280 batch 16/56 train_loss=0.001954
pass 274/280 batch 21/56 train_loss=0.002021
pass 274/280 batch 26/56 train_loss=0.001967
pass 274/280 batch 31/56 train_loss=0.002085
pass 274/280 batch 36/56 train_loss=0.002002
pass 274/280 batch 41/56 train_loss=0.002008
pass 274/280 batch 46/56 train_loss=0.001896
pass 274/280 batch 51/56 train_loss=0.002115 val_loss=0.002018
pass 274/280 batch 56/56 train_loss=0.001958
pass 275/280 batch 1/56 train_loss=0.001927 val_loss=0.002017
pass 275/280 batch 6/56 train_loss=0.002111
pass 275/280 batch 11/56 train_loss=0.002046
pass 275/280 batch 16/56 train_loss=0.001818
pass 275/280 batch 21/56 train_loss=0.002053
pass 275/280 batch 26/56 train_loss=0.001987
pass 275/280 batch 31/56 train_loss=0.002032
pass 275/280 batch 36/56 train_loss=0.002116
pass 275/280 batch 41/56 train_loss=0.002077
pass 275/280 batch 46/56 train_loss=0.001957
pass 275/280 batch 51/56 train_loss=0.002064 val_loss=0.002015
```

```
pass 275/280 batch 56/56 train_loss=0.002058
pass 276/280 batch 1/56 train_loss=0.001980 val_loss=0.002012
pass 276/280 batch 6/56 train_loss=0.001934
pass 276/280 batch 11/56 train_loss=0.001927
pass 276/280 batch 16/56 train_loss=0.001918
pass 276/280 batch 21/56 train_loss=0.002103
pass 276/280 batch 26/56 train_loss=0.001922
pass 276/280 batch 31/56 train_loss=0.001948
pass 276/280 batch 36/56 train_loss=0.002025
pass 276/280 batch 41/56 train_loss=0.002040
pass 276/280 batch 46/56 train_loss=0.002208
pass 276/280 batch 51/56 train_loss=0.001940 val_loss=0.002007
pass 276/280 batch 56/56 train_loss=0.001980
pass 277/280 batch 1/56 train_loss=0.001899 val_loss=0.002007
pass 277/280 batch 6/56 train_loss=0.001846
pass 277/280 batch 11/56 train_loss=0.001948
pass 277/280 batch 16/56 train_loss=0.001977
pass 277/280 batch 21/56 train_loss=0.002117
pass 277/280 batch 26/56 train_loss=0.001982
pass 277/280 batch 31/56 train_loss=0.001874
pass 277/280 batch 36/56 train_loss=0.001944
pass 277/280 batch 41/56 train_loss=0.001867
pass 277/280 batch 46/56 train_loss=0.002173
pass 277/280 batch 51/56 train_loss=0.001992 val_loss=0.002004
pass 277/280 batch 56/56 train_loss=0.001986
pass 278/280 batch 1/56 train_loss=0.001879 val_loss=0.002009
pass 278/280 batch 6/56 train_loss=0.002003
pass 278/280 batch 11/56 train_loss=0.001892
pass 278/280 batch 16/56 train_loss=0.001996
pass 278/280 batch 21/56 train_loss=0.002054
pass 278/280 batch 26/56 train_loss=0.001942
pass 278/280 batch 31/56 train_loss=0.001831
pass 278/280 batch 36/56 train_loss=0.001883
pass 278/280 batch 41/56 train_loss=0.001877
pass 278/280 batch 46/56 train_loss=0.001949
pass 278/280 batch 51/56 train_loss=0.001938 val_loss=0.001997
pass 278/280 batch 56/56 train_loss=0.002006
pass 279/280 batch 1/56 train_loss=0.002011 val_loss=0.001997
pass 279/280 batch 6/56 train_loss=0.001958
pass 279/280 batch 11/56 train_loss=0.001798
pass 279/280 batch 16/56 train_loss=0.001874
pass 279/280 batch 21/56 train_loss=0.002003
pass 279/280 batch 26/56 train_loss=0.001919
pass 279/280 batch 31/56 train_loss=0.002043
pass 279/280 batch 36/56 train_loss=0.002005
pass 279/280 batch 41/56 train_loss=0.002072
pass 279/280 batch 46/56 train_loss=0.001862
pass 279/280 batch 51/56 train_loss=0.002028 val_loss=0.001993
pass 279/280 batch 56/56 train_loss=0.001973
pass 280/280 batch 1/56 train_loss=0.002015 val_loss=0.001991
pass 280/280 batch 6/56 train_loss=0.001874
pass 280/280 batch 11/56 train_loss=0.002020
pass 280/280 batch 16/56 train_loss=0.001934
pass 280/280 batch 21/56 train_loss=0.001999
pass 280/280 batch 26/56 train_loss=0.001883
pass 280/280 batch 31/56 train_loss=0.002048
pass 280/280 batch 36/56 train_loss=0.002021
pass 280/280 batch 41/56 train_loss=0.001804
pass 280/280 batch 46/56 train_loss=0.001833
pass 280/280 batch 51/56 train_loss=0.001944 val_loss=0.001987
```
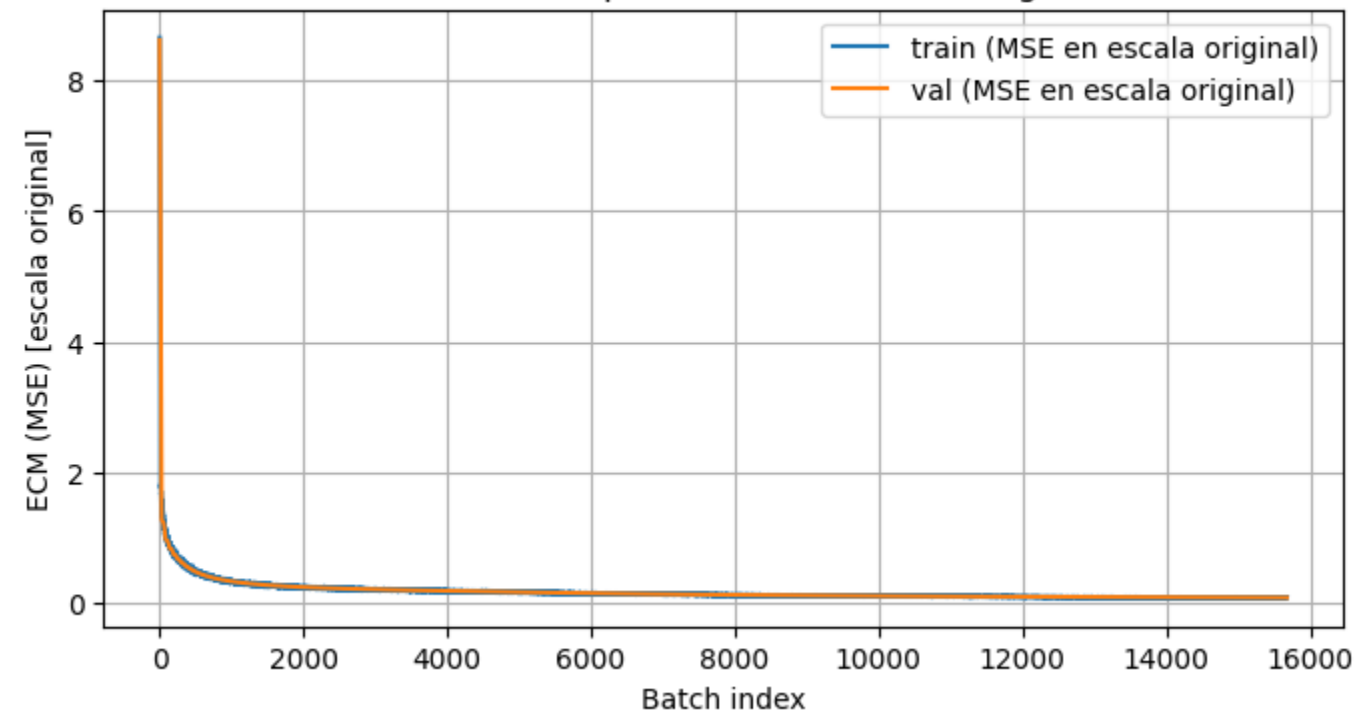
```
pass 280/280 batch 56/56 train_loss=0.002253
Tiempo entrenamiento (a): 558.53s
Últimos 5 train losses (scaled): [0.0020636353507933964, 0.0018654799143148853, 0.002007226004577398, 0.0019014395827353994, 0.002253217173567703]
Últimos 5 val losses (scaled): [0.00199713374249257, 0.0019965721804576634, 0.001992597714753713, 0.0019913689705918732, 0.001987144682779266]
```
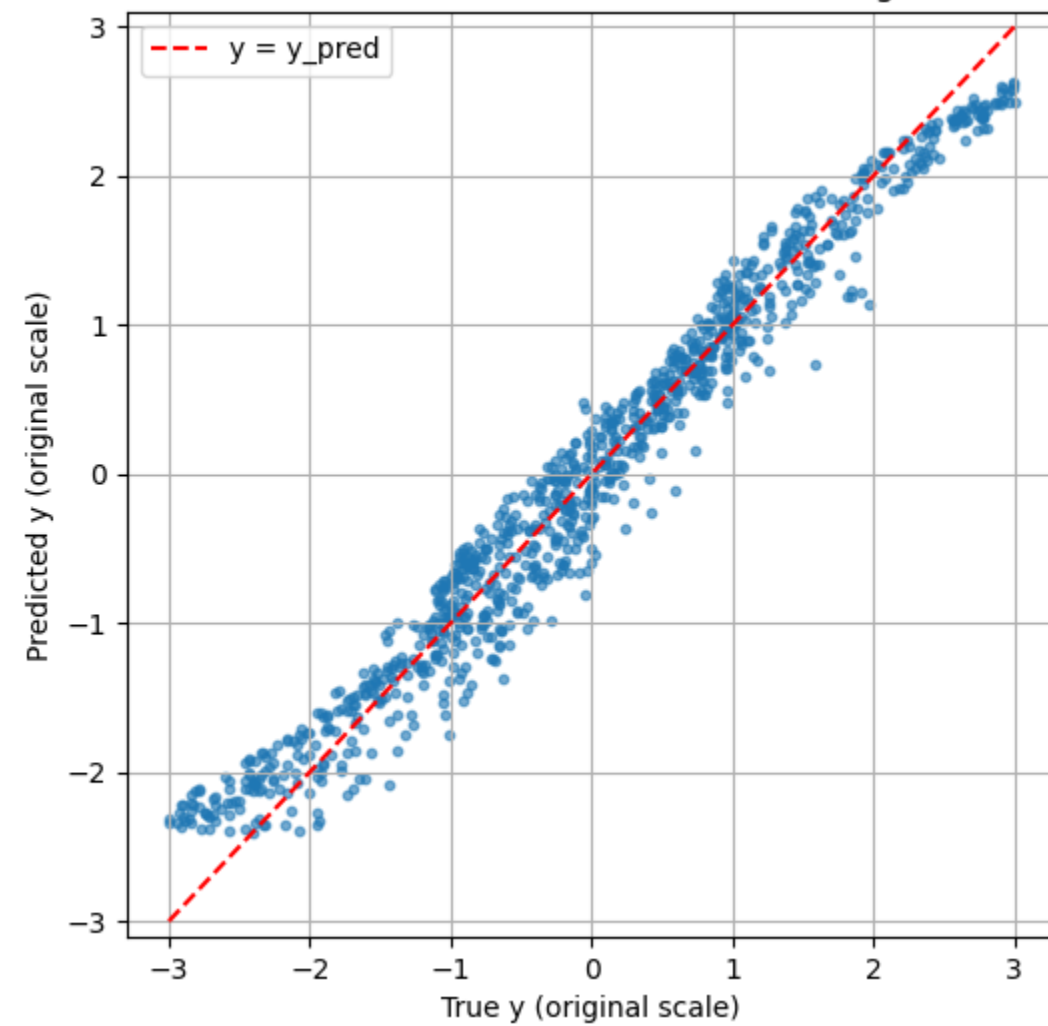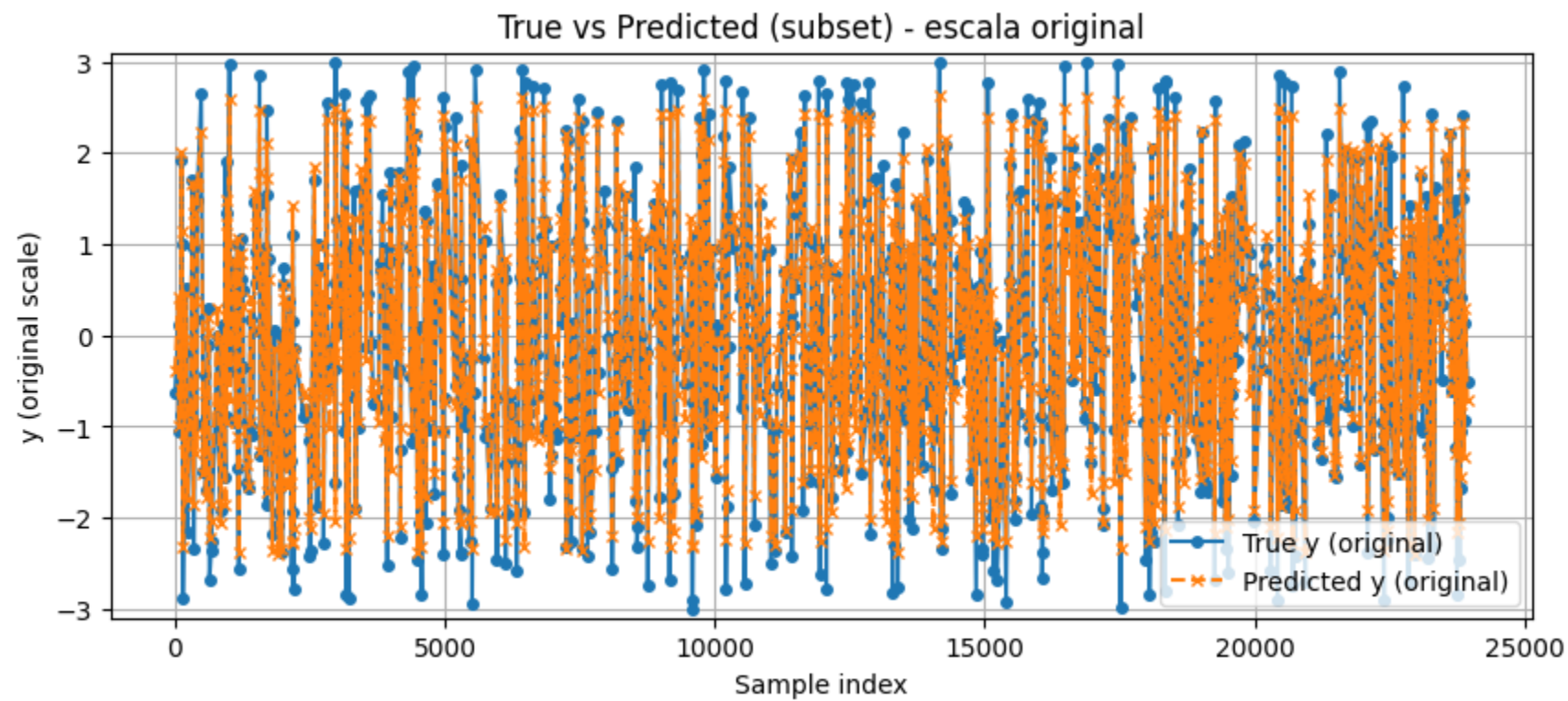

Inciso (a) - MSE por minibatch (escala original)

Predicción vs Real (scatter) - escala original

True vs Predicted (subset) - escala original

```
Ejemplo:
Entrada (x,y,z): [0.5, 1.0, -1]
Predicción (escala original): 0.155983
Valor real (escala original): 0.019728
```

C:\Users\q\AppData\Local\Temp\ipykernel_17892\3400245446.py:97: DeprecationWarning: Conversion of an array with ndim > 0 to a scalar is deprecated, and will error in future. Ensure you extract a single element from your array before performing this operation. (Deprecated NumPy 1.25.)
  pred_orig = float(inverse_scale(pred_scaled))

Out[18]: 0.15598316084555996

In [22]:
```python
# ---- Inciso (b): usar solo 40 muestras de entrenamiento y comparar minibatch sizes ----
print('\n--- Inciso (b): comparar minibatch size = 40 vs = 1 (con solo 40 muestras de entrenamiento) ---')
# seleccionar 40 muestras aleatorias del conjunto de entrenamiento escalado
n_small = 40
N_train = X_train_arr.shape[0]
idx_small = rng.choice(N_train, size=n_small, replace=False)
X_small = X_train_arr[idx_small]
y_small = y_train_arr[idx_small]

# Mostrar algunos valores reales (desescalados) para verificar rango
print('Algunas Y (original scale) del subset de 40:')
print(inverse_scale(y_small[:6].reshape(-1)))

# Experimento 1: minibatch = 40 (batch gradient descent w.r.t dataset_small)
model_b1 = perceptron_multicapa(capas=[30,1], dim_entrada=3)
start = time.time()
# usamos muchas pasadas para ver sobreajuste/variación, entrenar con epochs=1 por minibatch
hist_b1 = model_b1.minibatch_training(X_small, y_small, tamanio=40, veces=1000, lr=0.1, epochs=1, X_val=X_test_arr, Y_val=y_test_arr, eval_every=20, verbose=False)
print(f'Tiempo experimento b1 (batch=40): {time.time()-start:.2f}s')
print('Len train history b1:', len(hist_b1['train']), 'Len val history b1:', len(hist_b1['val']))

# Graficar
plot_train_val(hist_b1, 'Inciso (b) - batch size 40 (MSE escala original)')
plot_pred_vs_true(X_test_arr, y_test_arr, model_b1, n_samples=1000)

# Evaluación numérica final (MSE en escala original)
def mse_original(model, X, y_scaled):
```

```python
        preds = model.predecir(np.asarray(X)).reshape(-1)
        preds_orig = inverse_scale(preds)
        y_orig = inverse_scale(np.asarray(y_scaled).reshape(-1))
        return float(np.mean((preds_orig - y_orig)**2))


mse_b1_train = mse_original(model_b1, X_small, y_small)
mse_b1_test = mse_original(model_b1, X_test_arr, y_test_arr)
print(f'MSE (original scale) para b1 - train (subset 40): {mse_b1_train:.6f}, test: {mse_b1_test:.6f}')

# Experimento 2: minibatch = 1 (stochastic)
model_b2 = perceptron_multicapa(capas=[30,1], dim_entrada=3)
start = time.time()
hist_b2 = model_b2.minibatch_training(X_small, y_small, tamanio=1, veces=1000, lr=0.1, epochs=1500, X_val=X_test_arr, Y_val=y_test_arr, eval_every=200, verbose=False)
print(f'Tiempo experimento b2 (batch=1): {time.time()-start:.2f}s')
print('Len train history b2:', len(hist_b2['train']), 'Len val history b2:', len(hist_b2['val']))

plot_train_val(hist_b2, 'Inciso (b) - batch size 1 (MSE escala original)')
plot_pred_vs_true(X_test_arr, y_test_arr, model_b2, n_samples=1000)

mse_b2_train = mse_original(model_b2, X_small, y_small)
mse_b2_test = mse_original(model_b2, X_test_arr, y_test_arr)
print(f'MSE (original scale) para b2 - train (subset 40): {mse_b2_train:.6f}, test: {mse_b2_test:.6f}')

# Resumen comparativo
print('\nResumen comparativo (MSE en escala original):')
print(f'  batch=40 -> train(subset40)={mse_b1_train:.6f}, test={mse_b1_test:.6f}')
print(f'  batch=1  -> train(subset40)={mse_b2_train:.6f}, test={mse_b2_test:.6f}')

print('\nObservaciones:')
print('- Con batch=40 (entrenamiento por batches del tamaño del dataset pequeño) suele converger de forma más estable pero puede sobreajustar si damos muchas pasadas.')
print('- Con batch=1 (estocástico) la trayectoria del error es más ruidosa; puede generalizar distinto según la tasa de aprendizaje y la cantidad de pasos.')

# Fin de celda de experimentos
```
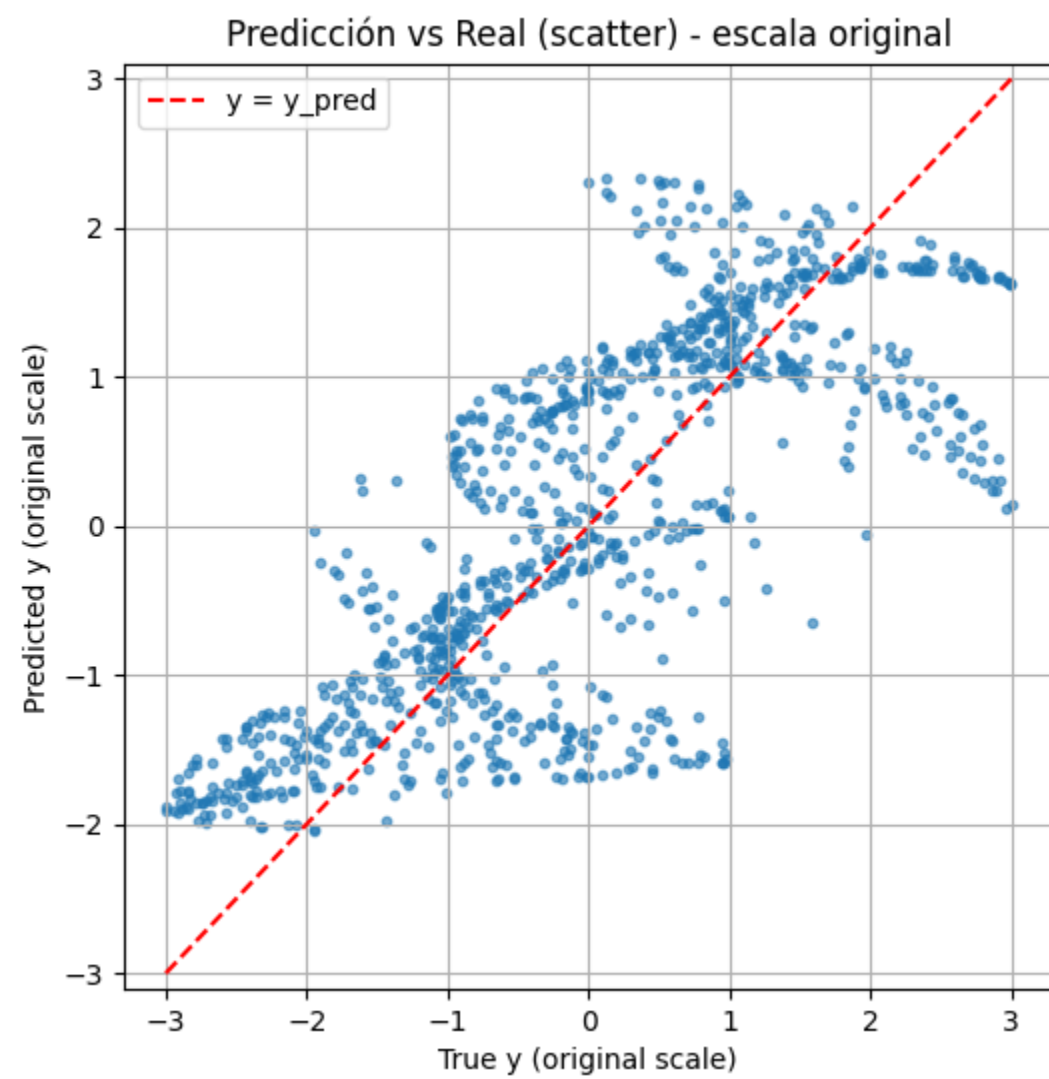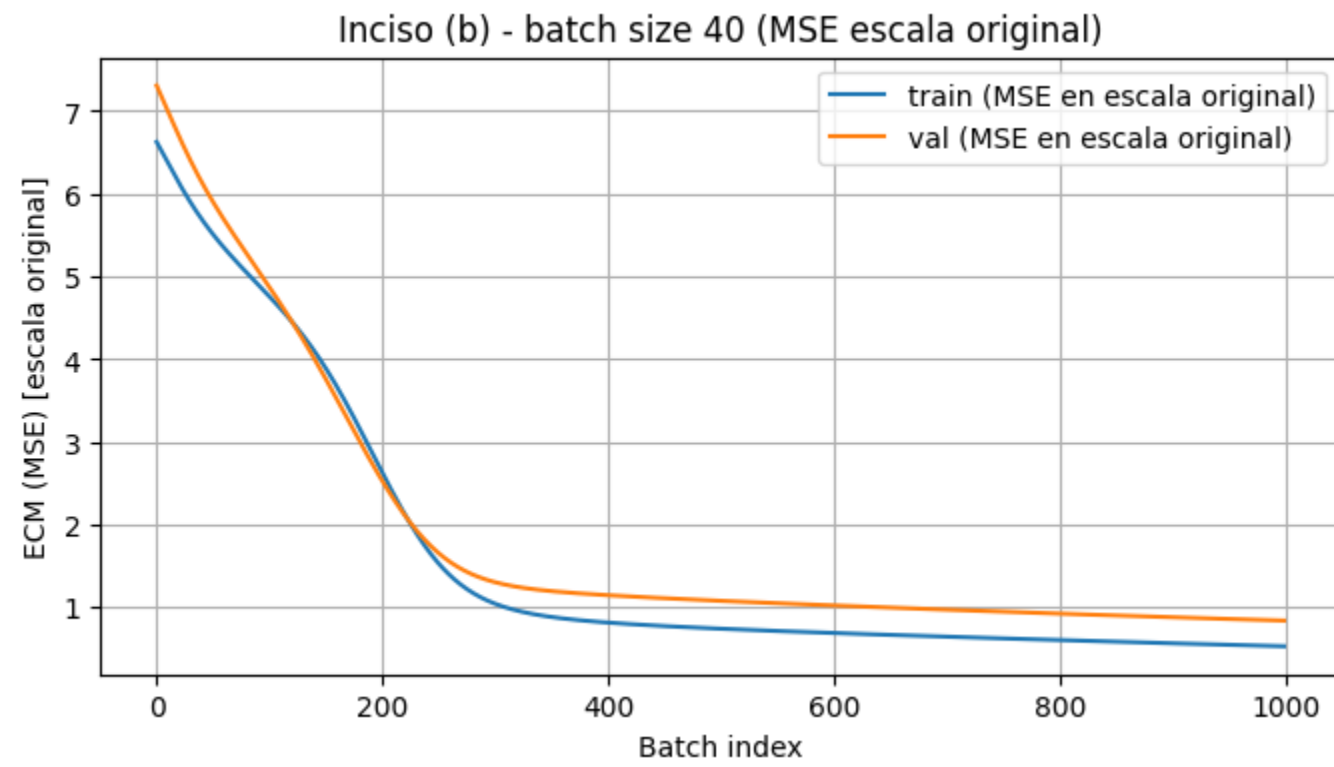
```
--- Inciso (b): comparar minibatch size = 40 vs = 1 (con solo 40 muestras de entrenamiento) ---
Algunas Y (original scale) del subset de 40:
[ 1.01945967 -1.03935378  0.03490754 -0.47011079  2.67452132  0.47378488]
Tiempo experimento b1 (batch=40): 155.86s
Len train history b1: 1000 Len val history b1: 1000
```
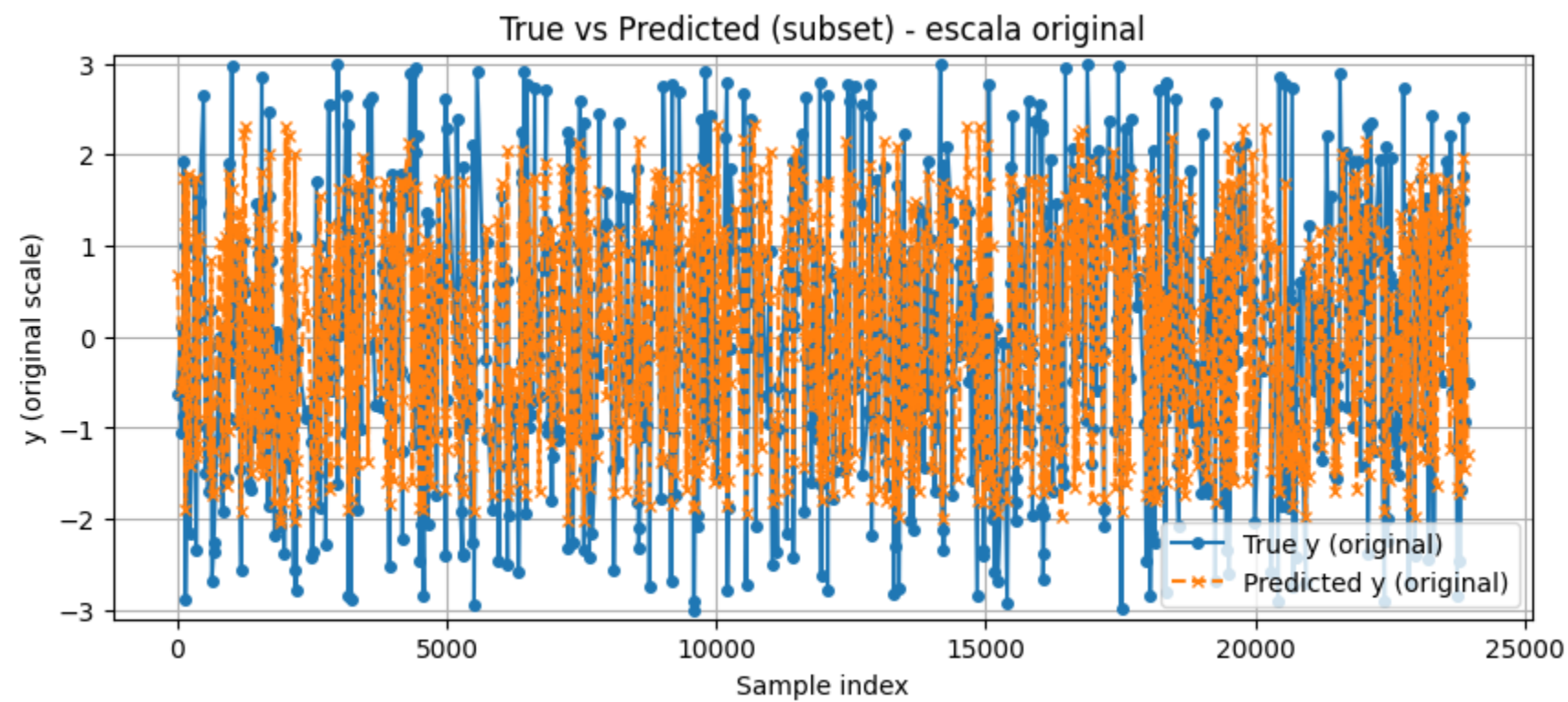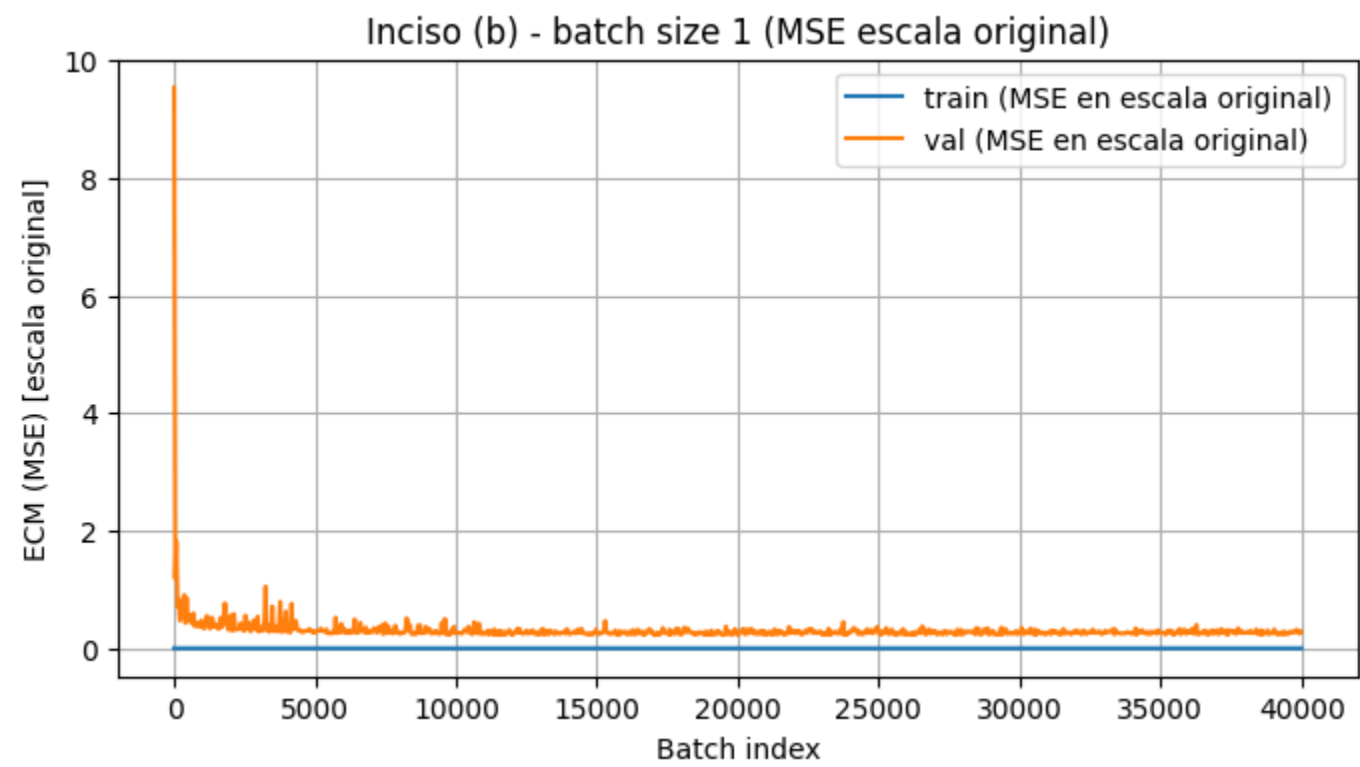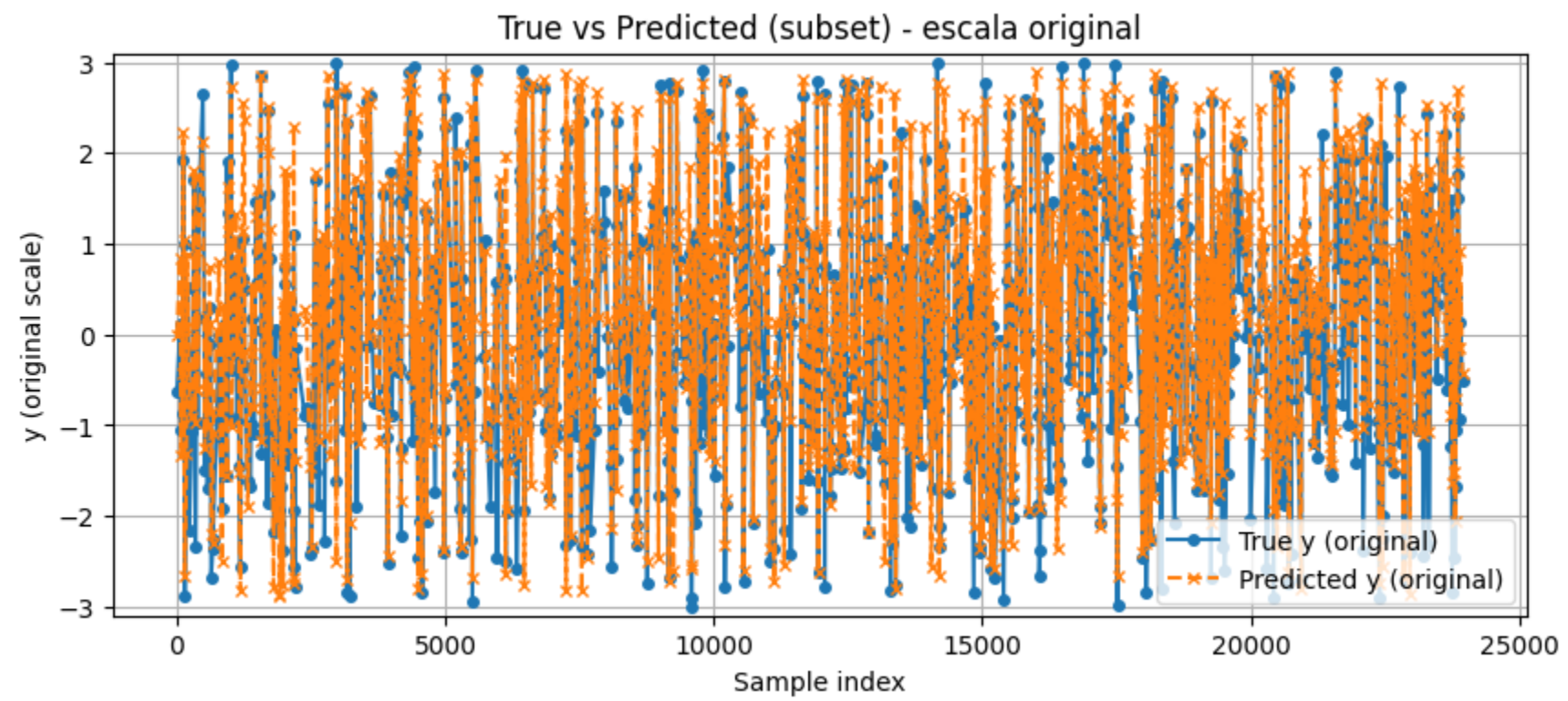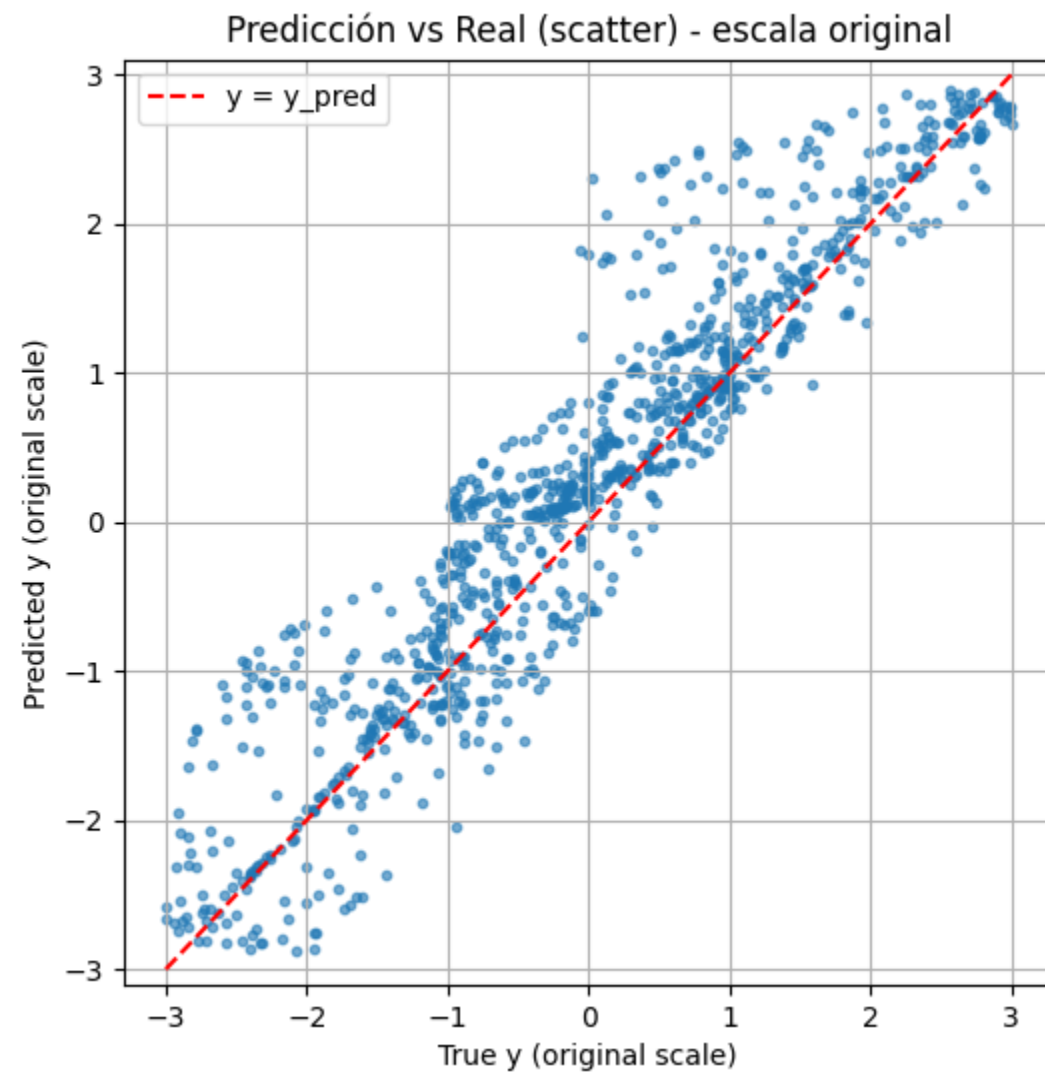
Inciso (b) - batch size 40 (MSE escala original)

Predicción vs Real (scatter) - escala original

True vs Predicted (subset) - escala original

MSE (original scale) para b1 - train (subset 40): 0.530199, test: 0.840762
Tiempo experimento b2 (batch=1): 1464.66s
Len train history b2: 40000 Len val history b2: 1000

Inciso (b) - batch size 1 (MSE escala original)

```
MSE (original scale) para b2 - train (subset 40): 0.010622, test: 0.286971

Resumen comparativo (MSE en escala original):
  batch=40 -> train(subset40)=0.530199, test=0.840762
  batch=1  -> train(subset40)=0.010622, test=0.286971

Observaciones:
- Con batch=40 (entrenamiento por batches del tamaño del dataset pequeño) suele converger de forma más estable pero puede sobreajustar si damos muchas pasadas.
- Con batch=1 (estocástico) la trayectoria del error es más ruidosa; puede generalizar distinto según la tasa de aprendizaje y la cantidad de pasos.
```

In [8]:
```python
# === Experimentos: Inciso (a) y (b) ===
# - (a) Entrenar en el dataset completo y mostrar evolución de error y predicciones
# - (b) Tomar un conjunto de entrenamiento con 40 muestras y comparar minibatch size = 40 vs = 1

import time

# Comprobaciones básicas
try:
    X_train_arr
    y_train_arr
    X_test_arr
    y_test_arr
except NameError:
    raise NameError('Ejecutá antes las celdas que generan y escalan X_train_arr / y_train_arr / X_test_arr / y_test_arr')

rng = np.random.default_rng(42)

# ---- Inciso (a): entrenar con el dataset grande (ya escalado a [0,1]) ----
print('\n--- Inciso (a): entrenamiento en dataset grande (ejemplo) ---')
start = time.time()
model_a = perceptron_multicapa(capas=[10,1], dim_entrada=3)
# parámetros moderados, rápido de correr: 5 pases, minibatch 40
# los epochs deben ser 1 porque queremos mostrar el minibatch solo 1 vez
hist_a = model_a.minibatch_training(X_train_arr, y_train_arr, tamanio=100, veces=10, lr=0.5, epochs=1, X_val=X_test_arr, Y_val=y_test_arr, eval_every=50, verbose=True)
print(f'Tiempo entrenamiento (a): {time.time()-start:.2f}s')
print('Últimos 5 train losses (scaled):', hist_a['train'][-5:])
if len(hist_a['val'])>0:
    print('Últimos 5 val losses (scaled):', hist_a['val'][-5:])

# Graficar (se muestran en escala original mediante las funciones que añadimos)
plot_train_val(hist_a, 'Inciso (a) - MSE por minibatch (escala original)')
plot_pred_vs_true(X_test_arr, y_test_arr, model_a, n_samples=1000)

# Ejemplo de predicción para una muestra concreta
example_xyz = [0.5, 1.0, -1]
print('\nEjemplo:')
show_prediction_for_xyz(example_xyz, model_a)


# ---- Inciso (a): entrenar con el dataset grande (ya escalado a [0,1]) ----
print('\n--- Inciso (a): entrenamiento en dataset grande (ejemplo) ---')
start = time.time()
model_a = perceptron_multicapa(capas=[10,1], dim_entrada=3)
# parámetros moderados, rápido de correr: 5 pases, minibatch 40
# los epochs deben ser 1 porque queremos mostrar el minibatch solo 1 vez
hist_a = model_a.minibatch_training(X_train_arr, y_train_arr, tamanio=1000, veces=10, lr=0.5, epochs=1, X_val=X_test_arr, Y_val=y_test_arr, eval_every=50, verbose=True)
print(f'Tiempo entrenamiento (a): {time.time()-start:.2f}s')
print('Últimos 5 train losses (scaled):', hist_a['train'][-5:])
if len(hist_a['val'])>0:
    print('Últimos 5 val losses (scaled):', hist_a['val'][-5:])
```
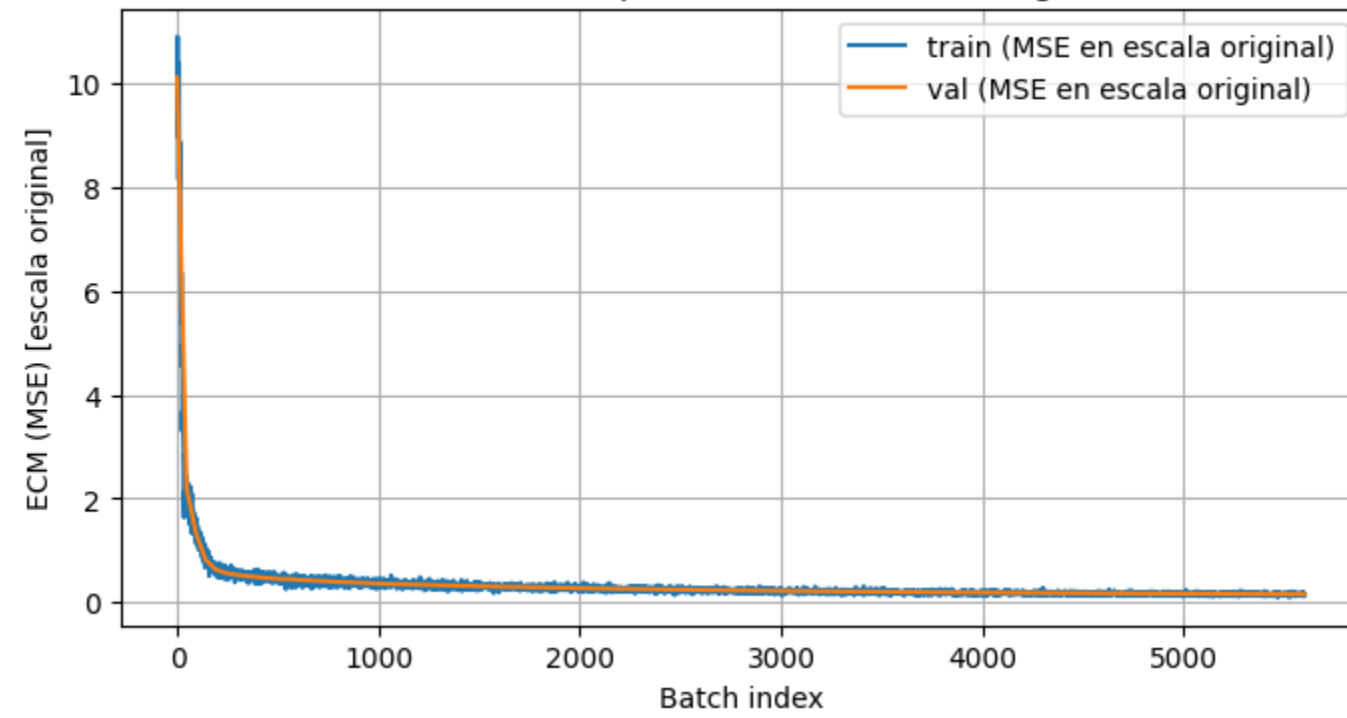
```python
# Graficar (se muestran en escala original mediante las funciones que añadimos)
plot_train_val(hist_a, 'Inciso (a) - MSE por minibatch (escala original)')
plot_pred_vs_true(X_test_arr, y_test_arr, model_a, n_samples=1000)

# Ejemplo de predicción para una muestra concreta
example_xyz = [0.5, 1.0, -1]
print('\nEjemplo:')
show_prediction_for_xyz(example_xyz, model_a)
```
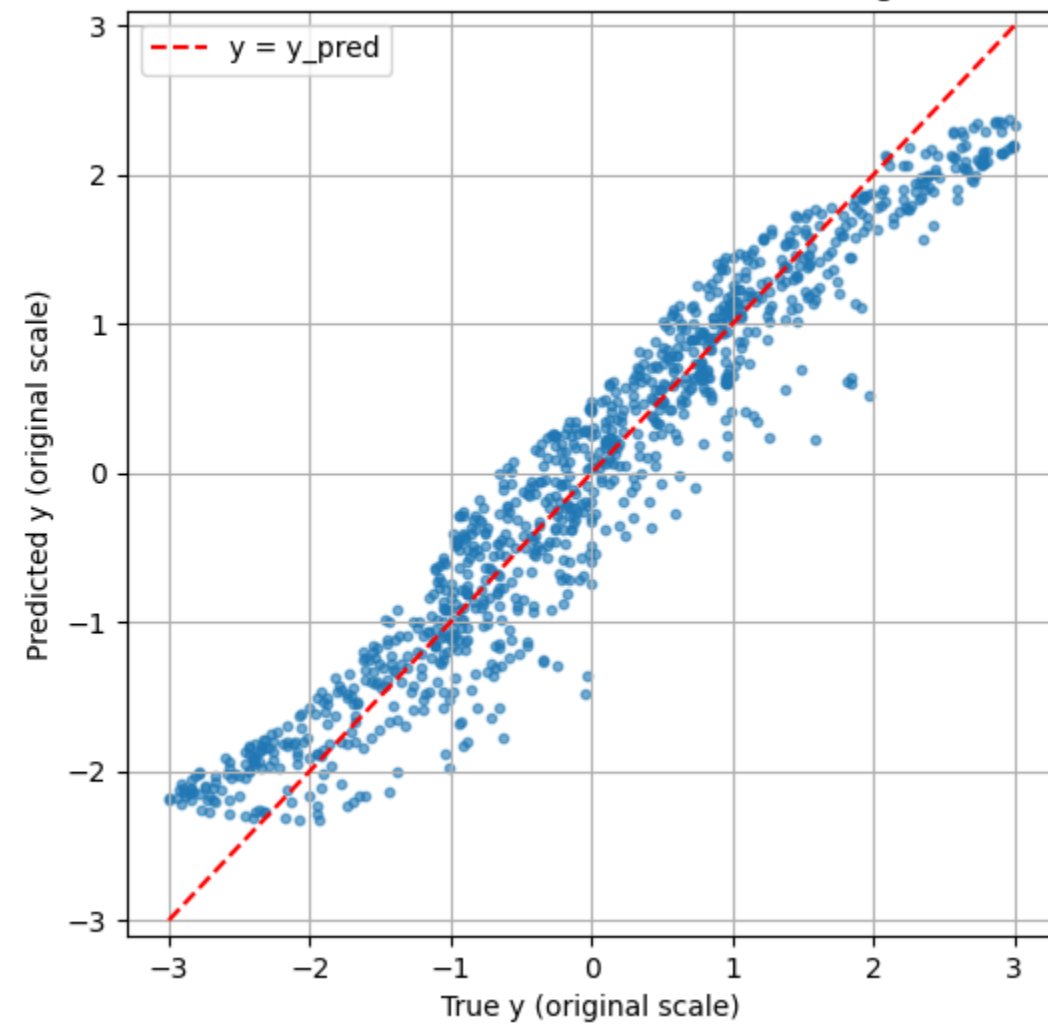
```
--- Inciso (a): entrenamiento en dataset grande (ejemplo) ---
pass 1/10 batch 1/560 train_loss=0.262236 val_loss=0.281123
pass 1/10 batch 57/560 train_loss=0.062286
pass 1/10 batch 113/560 train_loss=0.031278
pass 1/10 batch 169/560 train_loss=0.022445
pass 1/10 batch 225/560 train_loss=0.016838
pass 1/10 batch 281/560 train_loss=0.017030
pass 1/10 batch 337/560 train_loss=0.013839
pass 1/10 batch 393/560 train_loss=0.015063
pass 1/10 batch 449/560 train_loss=0.011881
pass 1/10 batch 505/560 train_loss=0.014379
pass 2/10 batch 1/560 train_loss=0.012684 val_loss=0.012437
pass 2/10 batch 57/560 train_loss=0.014123
pass 2/10 batch 113/560 train_loss=0.012887
pass 2/10 batch 169/560 train_loss=0.011556
pass 2/10 batch 225/560 train_loss=0.009985
pass 2/10 batch 281/560 train_loss=0.011548
pass 2/10 batch 337/560 train_loss=0.009693
pass 2/10 batch 393/560 train_loss=0.008806
pass 2/10 batch 449/560 train_loss=0.007732
pass 2/10 batch 505/560 train_loss=0.010032
pass 3/10 batch 1/560 train_loss=0.011399 val_loss=0.009727
pass 3/10 batch 57/560 train_loss=0.008916
pass 3/10 batch 113/560 train_loss=0.010864
pass 3/10 batch 169/560 train_loss=0.008383
pass 3/10 batch 225/560 train_loss=0.009253
pass 3/10 batch 281/560 train_loss=0.007815
pass 3/10 batch 337/560 train_loss=0.009117
pass 3/10 batch 393/560 train_loss=0.008464
pass 3/10 batch 449/560 train_loss=0.007000
pass 3/10 batch 505/560 train_loss=0.007629
pass 4/10 batch 1/560 train_loss=0.006923 val_loss=0.008270
pass 4/10 batch 57/560 train_loss=0.006484
pass 4/10 batch 113/560 train_loss=0.008364
pass 4/10 batch 169/560 train_loss=0.009250
pass 4/10 batch 225/560 train_loss=0.007213
pass 4/10 batch 281/560 train_loss=0.008190
pass 4/10 batch 337/560 train_loss=0.008083
pass 4/10 batch 393/560 train_loss=0.007729
pass 4/10 batch 449/560 train_loss=0.006200
pass 4/10 batch 505/560 train_loss=0.006923
pass 5/10 batch 1/560 train_loss=0.006983 val_loss=0.007213
pass 5/10 batch 57/560 train_loss=0.007008
pass 5/10 batch 113/560 train_loss=0.008141
pass 5/10 batch 169/560 train_loss=0.008083
pass 5/10 batch 225/560 train_loss=0.005250
pass 5/10 batch 281/560 train_loss=0.005920
pass 5/10 batch 337/560 train_loss=0.007377
pass 5/10 batch 393/560 train_loss=0.005539
pass 5/10 batch 449/560 train_loss=0.004786
pass 5/10 batch 505/560 train_loss=0.006687
pass 6/10 batch 1/560 train_loss=0.007540 val_loss=0.006412
pass 6/10 batch 57/560 train_loss=0.005883
pass 6/10 batch 113/560 train_loss=0.006021
pass 6/10 batch 169/560 train_loss=0.007022
pass 6/10 batch 225/560 train_loss=0.006502
pass 6/10 batch 281/560 train_loss=0.006156
pass 6/10 batch 337/560 train_loss=0.007051
pass 6/10 batch 393/560 train_loss=0.006157
pass 6/10 batch 449/560 train_loss=0.006257
```
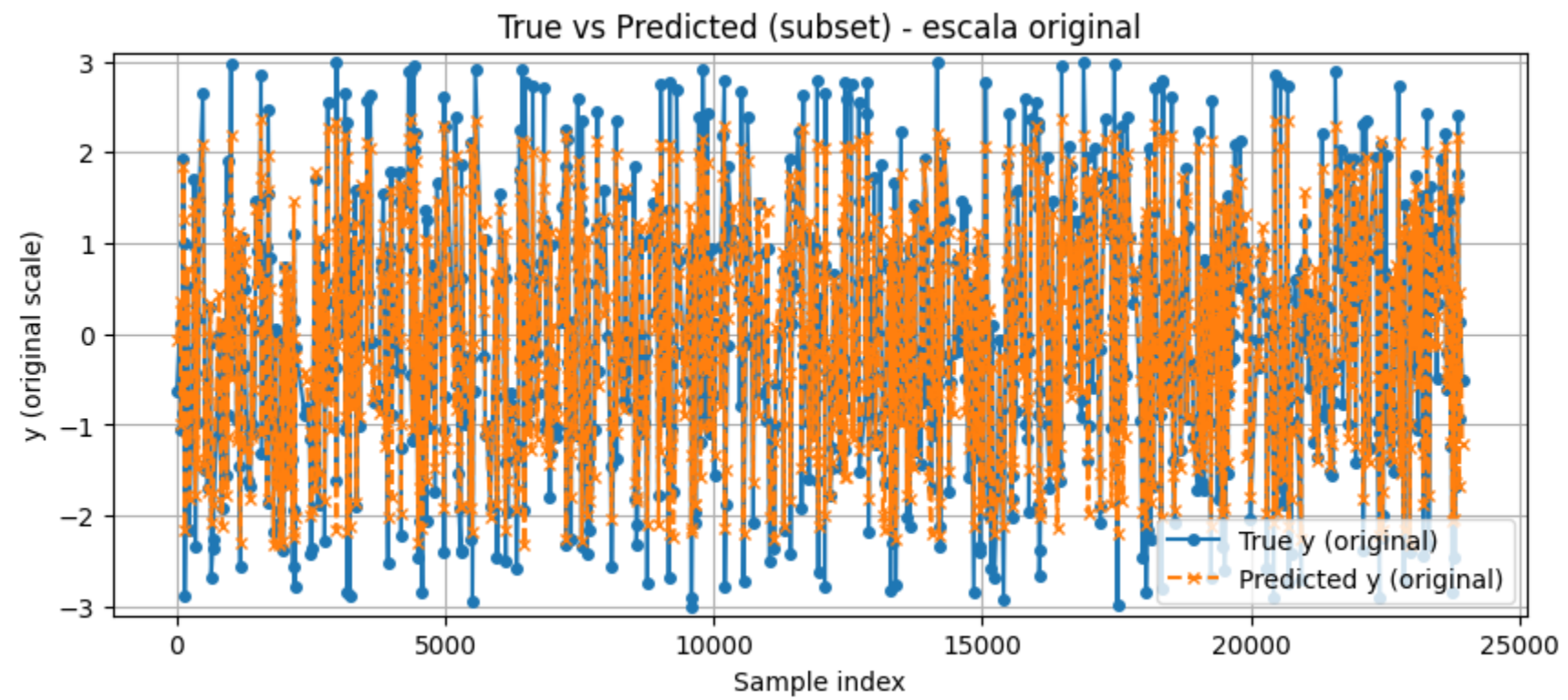
```
pass 6/10 batch 505/560 train_loss=0.005776
pass 7/10 batch 1/560 train_loss=0.006762 val_loss=0.005775
pass 7/10 batch 57/560 train_loss=0.004806
pass 7/10 batch 113/560 train_loss=0.004217
pass 7/10 batch 169/560 train_loss=0.005132
pass 7/10 batch 225/560 train_loss=0.005483
pass 7/10 batch 281/560 train_loss=0.004643
pass 7/10 batch 337/560 train_loss=0.005861
pass 7/10 batch 393/560 train_loss=0.004365
pass 7/10 batch 449/560 train_loss=0.004875
pass 7/10 batch 505/560 train_loss=0.004541
pass 8/10 batch 1/560 train_loss=0.004578 val_loss=0.005285
pass 8/10 batch 57/560 train_loss=0.004248
pass 8/10 batch 113/560 train_loss=0.005957
pass 8/10 batch 169/560 train_loss=0.003927
pass 8/10 batch 225/560 train_loss=0.005032
pass 8/10 batch 281/560 train_loss=0.005275
pass 8/10 batch 337/560 train_loss=0.003932
pass 8/10 batch 393/560 train_loss=0.004765
pass 8/10 batch 449/560 train_loss=0.004213
pass 8/10 batch 505/560 train_loss=0.004801
pass 9/10 batch 1/560 train_loss=0.004122 val_loss=0.004907
pass 9/10 batch 57/560 train_loss=0.005311
pass 9/10 batch 113/560 train_loss=0.003917
pass 9/10 batch 169/560 train_loss=0.005345
pass 9/10 batch 225/560 train_loss=0.003943
pass 9/10 batch 281/560 train_loss=0.004524
pass 9/10 batch 337/560 train_loss=0.004728
pass 9/10 batch 393/560 train_loss=0.005256
pass 9/10 batch 449/560 train_loss=0.003706
pass 9/10 batch 505/560 train_loss=0.004577
pass 10/10 batch 1/560 train_loss=0.003331 val_loss=0.004650
pass 10/10 batch 57/560 train_loss=0.005006
pass 10/10 batch 113/560 train_loss=0.005231
pass 10/10 batch 169/560 train_loss=0.005006
pass 10/10 batch 225/560 train_loss=0.004796
pass 10/10 batch 281/560 train_loss=0.005253
pass 10/10 batch 337/560 train_loss=0.004500
pass 10/10 batch 393/560 train_loss=0.003663
pass 10/10 batch 449/560 train_loss=0.004245
pass 10/10 batch 505/560 train_loss=0.003566
Tiempo entrenamiento (a): 35.44s
Últimos 5 train losses (scaled): [0.004019906441934139, 0.00510675976744157, 0.0032040977124079945, 0.003927437092899393, 0.0041062489650538474]
Últimos 5 val losses (scaled): [0.004429490582835925, 0.004409517545065844, 0.004398466386355762, 0.004374494355173766, 0.0043446469911430155]
```

True vs Predicted (subset) - escala original

```
Ejemplo:
Entrada (x,y,z): [0.5, 1.0, -1]
Predicción (escala original): 0.196217
Valor real (escala original): 0.019728

--- Inciso (a): entrenamiento en dataset grande (ejemplo) ---
pass 1/10 batch 1/56 train_loss=0.266474 val_loss=0.253832
```
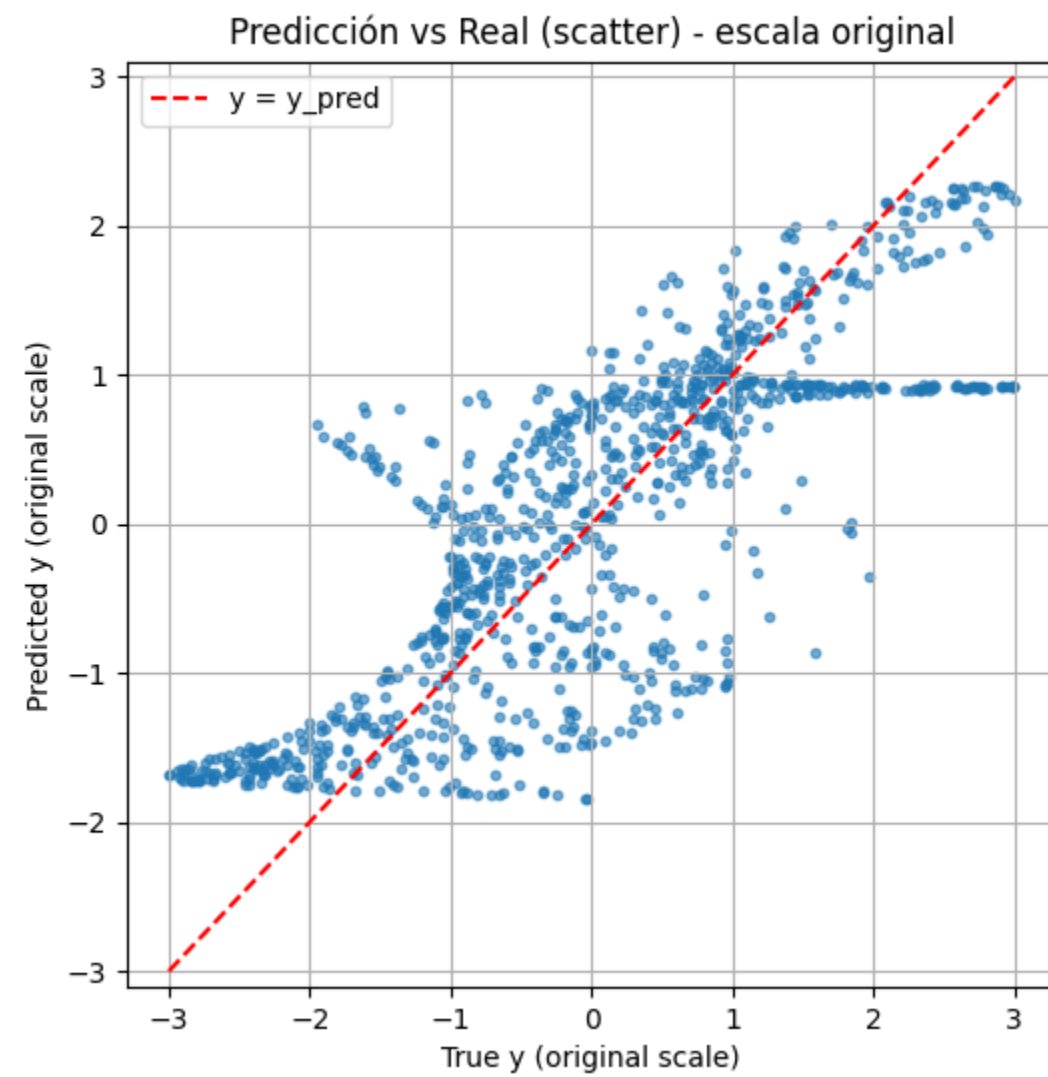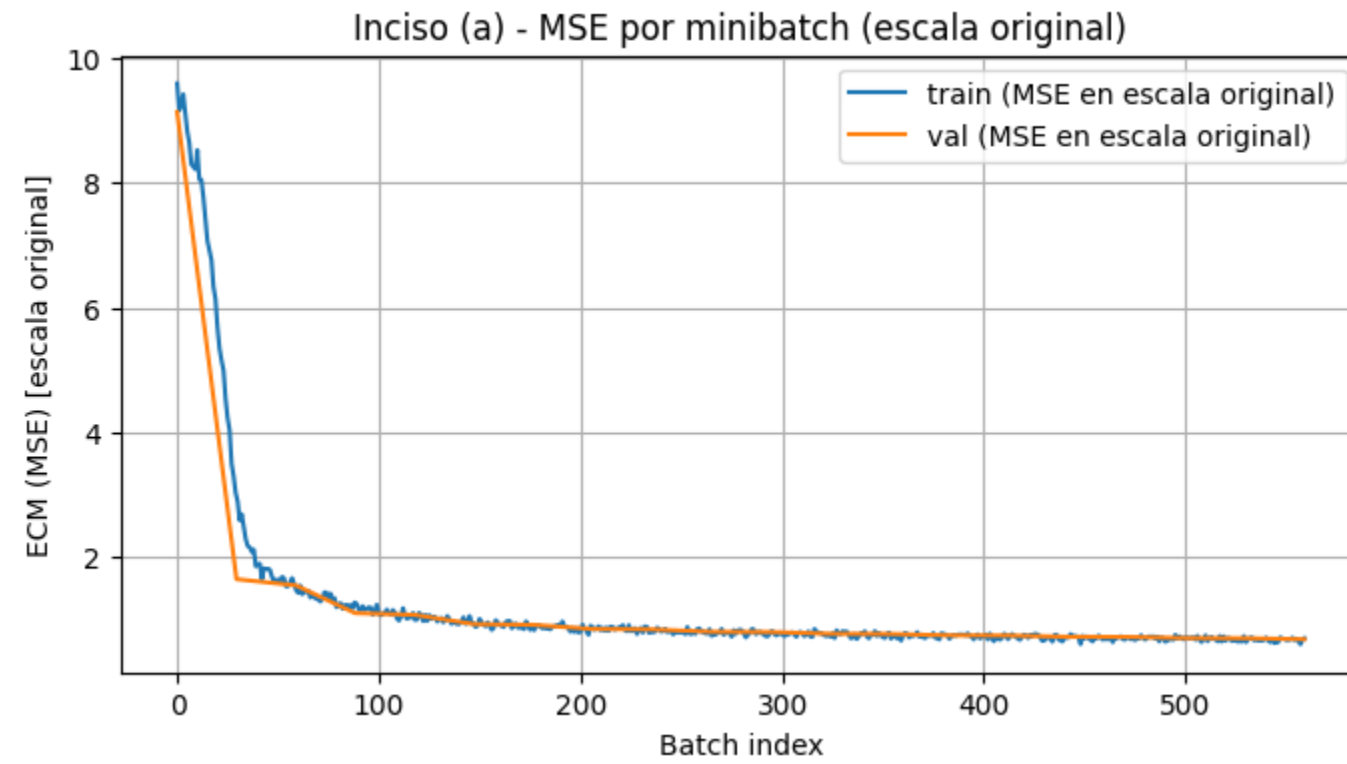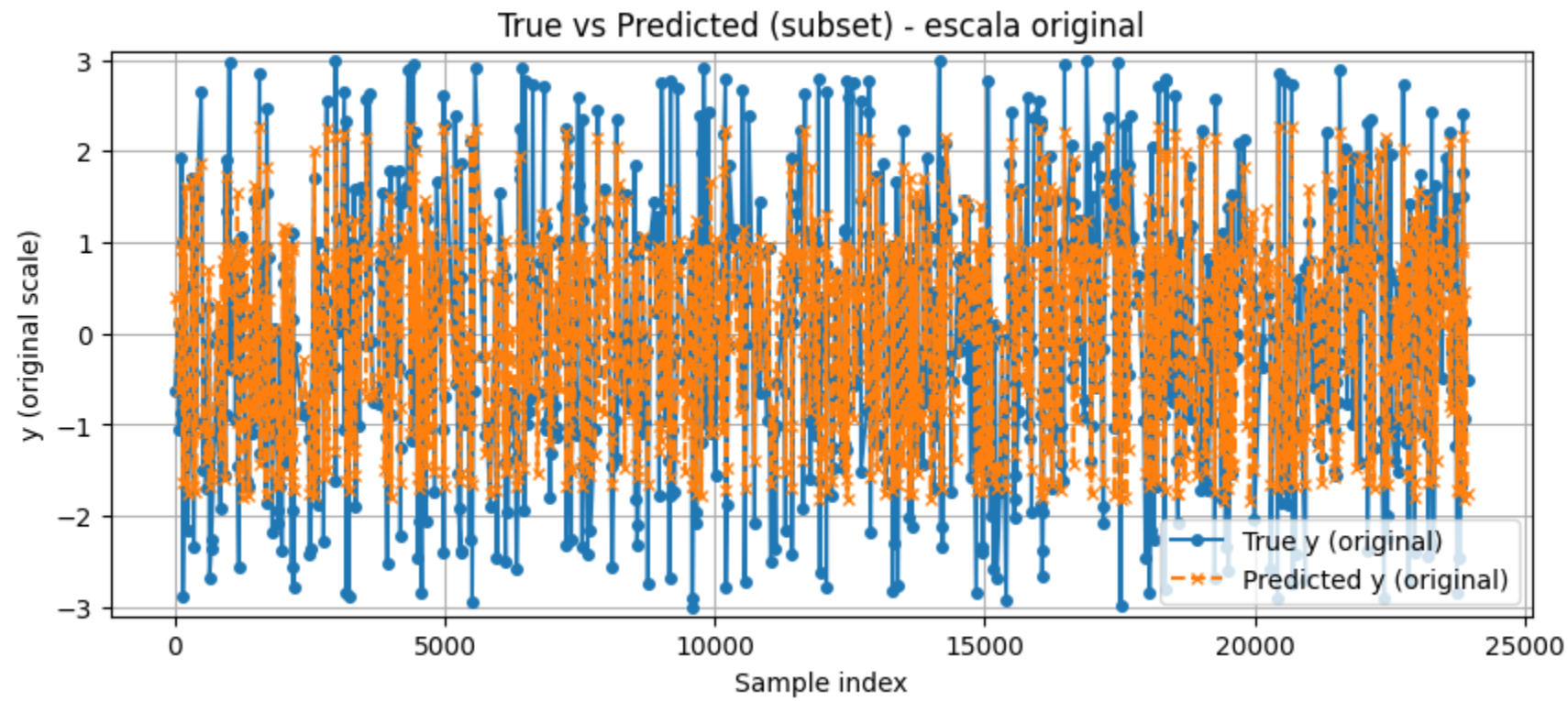
```
C:\Users\q\AppData\Local\Temp\ipykernel_17892\3400245446.py:97: DeprecationWarning: Conversion of an array with ndim > 0 to a scalar is deprecated, and will error in future. Ensure you extract
a single element from your array before performing this operation. (Deprecated NumPy 1.25.)
  pred_orig = float(inverse_scale(pred_scaled))
```

```
pass 1/10 batch 6/56 train_loss=0.245277
pass 1/10 batch 11/56 train_loss=0.236867
pass 1/10 batch 16/56 train_loss=0.196438
pass 1/10 batch 21/56 train_loss=0.157798
pass 1/10 batch 26/56 train_loss=0.117573
pass 1/10 batch 31/56 train_loss=0.080323
pass 1/10 batch 36/56 train_loss=0.060474
pass 1/10 batch 41/56 train_loss=0.052265
pass 1/10 batch 46/56 train_loss=0.050387
pass 1/10 batch 51/56 train_loss=0.045468 val_loss=0.045731
pass 1/10 batch 56/56 train_loss=0.042618
pass 2/10 batch 1/56 train_loss=0.044135 val_loss=0.042979
pass 2/10 batch 6/56 train_loss=0.042894
pass 2/10 batch 11/56 train_loss=0.037584
pass 2/10 batch 16/56 train_loss=0.035747
pass 2/10 batch 21/56 train_loss=0.039322
pass 2/10 batch 26/56 train_loss=0.035041
pass 2/10 batch 31/56 train_loss=0.034150
pass 2/10 batch 36/56 train_loss=0.031858
pass 2/10 batch 41/56 train_loss=0.033022
pass 2/10 batch 46/56 train_loss=0.029681
pass 2/10 batch 51/56 train_loss=0.029997 val_loss=0.030622
pass 2/10 batch 56/56 train_loss=0.029122
pass 3/10 batch 1/56 train_loss=0.032823 val_loss=0.029838
pass 3/10 batch 6/56 train_loss=0.030672
pass 3/10 batch 11/56 train_loss=0.027039
pass 3/10 batch 16/56 train_loss=0.029078
pass 3/10 batch 21/56 train_loss=0.026512
pass 3/10 batch 26/56 train_loss=0.027054
pass 3/10 batch 31/56 train_loss=0.028749
pass 3/10 batch 36/56 train_loss=0.025972
pass 3/10 batch 41/56 train_loss=0.025451
pass 3/10 batch 46/56 train_loss=0.024077
pass 3/10 batch 51/56 train_loss=0.024393 val_loss=0.025742
pass 3/10 batch 56/56 train_loss=0.025565
pass 4/10 batch 1/56 train_loss=0.025930 val_loss=0.025402
pass 4/10 batch 6/56 train_loss=0.026912
pass 4/10 batch 11/56 train_loss=0.025119
pass 4/10 batch 16/56 train_loss=0.023701
pass 4/10 batch 21/56 train_loss=0.025009
pass 4/10 batch 26/56 train_loss=0.024399
pass 4/10 batch 31/56 train_loss=0.023875
pass 4/10 batch 36/56 train_loss=0.022787
pass 4/10 batch 41/56 train_loss=0.023817
pass 4/10 batch 46/56 train_loss=0.024232
pass 4/10 batch 51/56 train_loss=0.023827 val_loss=0.023536
pass 4/10 batch 56/56 train_loss=0.022499
pass 5/10 batch 1/56 train_loss=0.025265 val_loss=0.023372
pass 5/10 batch 6/56 train_loss=0.022817
pass 5/10 batch 11/56 train_loss=0.021794
pass 5/10 batch 16/56 train_loss=0.023603
pass 5/10 batch 21/56 train_loss=0.022523
pass 5/10 batch 26/56 train_loss=0.021878
pass 5/10 batch 31/56 train_loss=0.021504
pass 5/10 batch 36/56 train_loss=0.023779
pass 5/10 batch 41/56 train_loss=0.023488
pass 5/10 batch 46/56 train_loss=0.022065
pass 5/10 batch 51/56 train_loss=0.021621 val_loss=0.022299
pass 5/10 batch 56/56 train_loss=0.023242
pass 6/10 batch 1/56 train_loss=0.022969 val_loss=0.022199
```

```
                     pass 6/10 batch 6/56 train_loss=0.023589
                     pass 6/10 batch 11/56 train_loss=0.021506
                     pass 6/10 batch 16/56 train_loss=0.022714
                     pass 6/10 batch 21/56 train_loss=0.021157
                     pass 6/10 batch 26/56 train_loss=0.022046
                     pass 6/10 batch 31/56 train_loss=0.021663
                     pass 6/10 batch 36/56 train_loss=0.020025
                     pass 6/10 batch 41/56 train_loss=0.021306
                     pass 6/10 batch 46/56 train_loss=0.021565
                     pass 6/10 batch 51/56 train_loss=0.022582 val_loss=0.021421
                     pass 6/10 batch 56/56 train_loss=0.019601
                     pass 7/10 batch 1/56 train_loss=0.021243 val_loss=0.021339
                     pass 7/10 batch 6/56 train_loss=0.022517
                     pass 7/10 batch 11/56 train_loss=0.022606
                     pass 7/10 batch 16/56 train_loss=0.019572
                     pass 7/10 batch 21/56 train_loss=0.020406
                     pass 7/10 batch 26/56 train_loss=0.021785
                     pass 7/10 batch 31/56 train_loss=0.020813
                     pass 7/10 batch 36/56 train_loss=0.019550
                     pass 7/10 batch 41/56 train_loss=0.019589
                     pass 7/10 batch 46/56 train_loss=0.021112
                     pass 7/10 batch 51/56 train_loss=0.020575 val_loss=0.020699
                     pass 7/10 batch 56/56 train_loss=0.020681
                     pass 8/10 batch 1/56 train_loss=0.021639 val_loss=0.020636
                     pass 8/10 batch 6/56 train_loss=0.021198
                     pass 8/10 batch 11/56 train_loss=0.018868
                     pass 8/10 batch 16/56 train_loss=0.019414
                     pass 8/10 batch 21/56 train_loss=0.018984
                     pass 8/10 batch 26/56 train_loss=0.019132
                     pass 8/10 batch 31/56 train_loss=0.019521
                     pass 8/10 batch 36/56 train_loss=0.020970
                     pass 8/10 batch 41/56 train_loss=0.020079
                     pass 8/10 batch 46/56 train_loss=0.018894
                     pass 8/10 batch 51/56 train_loss=0.019685 val_loss=0.020073
                     pass 8/10 batch 56/56 train_loss=0.019632
                     pass 9/10 batch 1/56 train_loss=0.016780 val_loss=0.020009
                     pass 9/10 batch 6/56 train_loss=0.018692
                     pass 9/10 batch 11/56 train_loss=0.019746
                     pass 9/10 batch 16/56 train_loss=0.019067
                     pass 9/10 batch 21/56 train_loss=0.020310
                     pass 9/10 batch 26/56 train_loss=0.018930
                     pass 9/10 batch 31/56 train_loss=0.020744
                     pass 9/10 batch 36/56 train_loss=0.019825
                     pass 9/10 batch 41/56 train_loss=0.019844
                     pass 9/10 batch 46/56 train_loss=0.018999
                     pass 9/10 batch 51/56 train_loss=0.019489 val_loss=0.019503
                     pass 9/10 batch 56/56 train_loss=0.019692
                     pass 10/10 batch 1/56 train_loss=0.019778 val_loss=0.019438
                     pass 10/10 batch 6/56 train_loss=0.019027
                     pass 10/10 batch 11/56 train_loss=0.019114
                     pass 10/10 batch 16/56 train_loss=0.020280
                     pass 10/10 batch 21/56 train_loss=0.018462
                     pass 10/10 batch 26/56 train_loss=0.020387
                     pass 10/10 batch 31/56 train_loss=0.018443
                     pass 10/10 batch 36/56 train_loss=0.018694
                     pass 10/10 batch 41/56 train_loss=0.017312
                     pass 10/10 batch 46/56 train_loss=0.019180
                     pass 10/10 batch 51/56 train_loss=0.018608 val_loss=0.018970
                     pass 10/10 batch 56/56 train_loss=0.019413
                     Tiempo entrenamiento (a): 18.96s
```

```
Últimos 5 train losses (scaled): [0.019229337394809646, 0.018369487148601354, 0.01674353228680989, 0.018874812872304553, 0.01941346106983852]
Últimos 5 val losses (scaled): [0.020073275959204637, 0.02000934042210537, 0.019503080397779513, 0.01943771057946221, 0.018970024020737872]
```


Inciso (a) - MSE por minibatch (escala original)

Predicción vs Real (scatter) - escala original

True vs Predicted (subset) - escala original

```
Ejemplo:
Entrada (x,y,z): [0.5, 1.0, -1]
Predicción (escala original): -0.442453
Valor real (escala original): 0.019728
```

Out[8]: -0.4424531931215059