

```

1  from .layers import *
2
3  def affine_relu_forward(x, w, b):
4      """
5          Convenience layer that performs an affine transform followed by a ReLU
6
7          Inputs:
8          - x: Input to the affine layer
9          - w, b: Weights for the affine layer
10
11          Returns a tuple of:
12          - out: Output from the ReLU
13          - cache: Object to give to the backward pass
14      """
15      a, fc_cache = affine_forward(x, w, b)
16      out, relu_cache = relu_forward(a)
17      cache = (fc_cache, relu_cache)
18      return out, cache
19
20
21  def affine_relu_backward(dout, cache):
22      """
23          Backward pass for the affine-relu convenience layer
24      """
25      fc_cache, relu_cache = cache
26      da = relu_backward(dout, relu_cache)
27      dx, dw, db = affine_backward(da, fc_cache)
28      return dx, dw, db
29
30  def affine_batchnorm_relu_forward(x, w, b, gamma, beta, bn_param):
31      a_out, a_cache = affine_forward(x, w, b)
32      batch_out, batch_cache = batchnorm_forward(a_out, gamma, beta, bn_param)
33      out, relu_cache = relu_forward(batch_out)
34      cache = (a_cache, relu_cache, batch_cache)
35      return out, cache
36
37  def affine_batchnorm_relu_backward(dout, cache):
38      a_cache, relu_cache, batch_cache = cache
39      dbatch = relu_backward(dout, relu_cache)
40      da, dgamma, dbeta = batchnorm_backward(dbatch, batch_cache)
41      dx, dw, db = affine_backward(da, a_cache)
42      return dx, dw, db, dgamma, dbeta

```