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# NAME: Alan Luo
# Assignment: hw_1
# Date: 09/10/2023
# Section: LEC002
```

```
import torch
```

```
print('Question 1\n')
```

```
# Question 1.4
```

```
# The length should be 2, there are effectively 2 'elements'
```

```
X = torch.zeros((2, 3, 4))
```

```
print(f'1.4: {len(X)}\n')
```

```
# Question 1.5
```

```
print('1.5: Yes, the length will always correspond to the 0th axis. len(X) will grab the number of elements along the 0th dimension\n')
```

```
# Question 1.6
```

```
A = torch.tensor([[1, 2, 3], [4, 5, 6]]) # creating an arbitrary 2d array 'A'
```

```
result = A / A.sum(axis=1)[:, None] # sums the elements along the first axis, performs elementwise division via broadcasting
```

```
print(f'1.5: {result}\n')
```

```
Question 1
```

```
1.4: 2
```

```
1.5: Yes, the length will always correspond to the 0th axis. len(X) will grab the number of elements along the 0th dimension
```

```
1.5: tensor([[0.1667, 0.3333, 0.5000],
            [0.2667, 0.3333, 0.4000]])
```

```
print('Question 2\n')
```

```
# Question 2a
```

```
a = torch.tensor([[1], [-2], [3], [2]])
```

```
b = torch.tensor([[2], [-3], [1], [-1]])
```

```
c = torch.mm(a, b.T)
```

```
d = torch.mm(a.T, b)
```

```
print(f'2a: c - {c}\nc dimensions - {c.size()}\nd - {d}\nd dimensions - {d.size()}\n')
```

```
# Question 2b (on written pdf)
```

```
# Question 2c
```

```
A = torch.arange(20).reshape(5, 4)
```

```
print(f'2c: {A}\n')
```

```
# Question 2d
```

```
print(f'2d: {A * A}')
```

```
Question 2
```

```
2a: c - tensor([[ 2, -3,  1, -1],
               [-4,  6, -2,  2],
               [ 6, -9,  3, -3],
               [ 4, -6,  2, -2]])
```

```
c dimensions - torch.Size([4, 4])
```

```
d - tensor([[9]])
```

```
d dimensions - torch.Size([1, 1])
```

```
2c: tensor([[ 0,  1,  2,  3],
           [ 4,  5,  6,  7],
           [ 8,  9, 10, 11],
           [12, 13, 14, 15],
           [16, 17, 18, 19]])
```

```
2d: tensor([[ 0,  1,  4,  9],
           [16, 25, 36, 49],
           [ 64, 81, 100, 121],
           [144, 169, 196, 225],
           [256, 289, 324, 361]])
```

```
print('Question 3\n')

# Question 3a
B = torch.arange(24).reshape(2, 3, 4)
print(f'3a: {B}')

# Question 3b
sum = torch.sum(b)
print(f'3b: {sum}')

# Question 3c
C = B[0]
D = B[1]

print(f'3c: C is {C},\nD is {D}')
```

Question 3

```
3a: tensor([[[ 0,  1,  2,  3],
              [ 4,  5,  6,  7],
              [ 8,  9, 10, 11]],
            [[12, 13, 14, 15],
              [16, 17, 18, 19],
              [20, 21, 22, 23]]])

3b: -1
3c: C is tensor([[ 0,  1,  2,  3],
                 [ 4,  5,  6,  7],
                 [ 8,  9, 10, 11]]),
D is tensor([[12, 13, 14, 15],
              [16, 17, 18, 19],
              [20, 21, 22, 23]])
```

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