Problem 3: Analyze battle

In this exercise, you will be analyzing the battle script output that is created in json format by the WorldOfTextCraft executable.

In [1]:

```python
import numpy as np
from readbattle import readbattle
import matplotlib.pyplot as plt
```

Get the data

In [2]:

```python
npdata = readbattle(infile='problem3.txt')
names = ['Arthas', 'Fordring', 'Thrall', 'Mograine', 'Jaina']
actions = ['Attacks', 'Defends', 'Heals', 'DamageReceived', 'HealingRecieved']
```

Make a plot of the attacks per turn

In [3]:

```python
# Make plot of attacks.
for iact,act in enumerate(actions):
    for iname,name in enumerate(names):
        plt.plot(npdata[iname,:,iact],label=name)
    plt.legend()
    plt.xlabel("Turn")
    plt.ylabel(act)
    plt.show()
```
Part a

Make plots of all action types for each character: ['Attacks', 'Defends', 'Heals', 'DamageReceived', 'HealingReceived']. (The Attacks are done in the last cell as an example). Label your axes and make a legend.

Part b

Using the matplotlib hist (https://matplotlib.org/3.1.1/api/_as_gen/matplotlib.pyplot.hist.html) function, create a single plot showing histograms of the Attacks for each character. Label your axes and make a legend.
In [4]:

```python
for iname, name in enumerate(names):
    plt.hist(npdata[iname, :, 0], bins=np.linspace(0, 40, 41), histtype='step', label=name)
plt.legend()
plt.xlabel("Attacks")
plt.ylabel("Number of Turns")
plt.show()
```

**Part c**

Repeat part b, but this time plot the *Attacks* only for turns where the character was healed.
In [5]:

```python
print(npdata.shape)
healedturns = npdata[:, :, -1] > 0
print(healedturns)

(5, 12, 5)
[[False False False False False False False False False False False False]
 [False False False False False False False False False False False False]
 [False False False False False False False False False False False False]
 [False False False False False False False False False False False False]
 [True True True True True True True True True True True True]
 [False False False False False False False False False False False False]]

In [6]:

attacks_when_healed = np.where(healedturns, npdata[:, :, 0], 0)
print(attacks_when_healed)
print(attacks_when_healed.shape)

[[ 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.]
 [ 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.]
 [ 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.]
 [20. 20. 40. 20. 20. 40. 20. 20. 40.  0.  0.  0.]
 [ 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.]]
(5, 12)
In [7]:

```python
for iname, name in enumerate(names):
    plt.hist(attacks_when_healed[iname], bins=np.linspace(0, 40, 41), histtype='step', label=name)
plt.legend()
plt.xlabel("Attacks")
plt.ylabel("Number of Turns with Healing")
plt.show()
```

In [ ]: