Homework 01, Isaac Hancock, ST371

Import Section

In [9]:
```
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd
import stemgraphic as stg
import statistics
```

Problem 35

Part A

Based on the stem and leaf plot below, we can assume that the median will be about the same as the mean because the plot is well centered and not that skewed in any one direction.

In [10]:
```
# Note that the time is in seconds
data = [389,356,359,363,375,424,325,394,402,373,373,370,364,366,364,325,339,393,392,369,37
arr = np.array(data)
stg.stem_graphic(arr,scale=10,asc=False)
```

Out[10]:
```
(<Figure size 540x252 with 1 Axes>, <Axes:>)
```

Part B

The mean and median have been calculated below.

In [11]:
```
median = statistics.median(data)
mean = statistics.mean(data)
print("Median: %0.4f Seconds" % (median))
print("Mean: %0.4f Seconds" % (mean))
```

```
Median: 369.5000 Seconds
Mean: 370.6923 Seconds
```

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Part C

The largest value, 424, could be increased by any amount and it would not effect the sample median. Conversly, the sample median **WOULD** be effected if one decreased the value to lower than the current median. Thus it could be decreased by a maximum of 424 - 370 = 54

Part D

In [12]:
```
# Convert seconds to minutes.
median = statistics.median(data)/60
mean = statistics.mean(data)/60
print("Median: %0.4f Minutes" % (median))
print("Mean: %0.4f Minutes" % (mean))
```

```
Median: 6.1583 Minutes
Mean: 6.1782 Minutes
```

Problem 43

The measure of centers that can be calculated are the median. The mean cannot be calculated because we only know that two of the lifetimes are greater than 100 and not actually 100. We do not know their real value and thus will most likely underestimate the value of the mean.

In [13]:
```
data = [48,79,100,35,92,86,57,100,17,29]
median = statistics.median(data)
print("Median: %0.0f Hours" %(median))
```

```
Median: 68 Hours
```

Problem 51

Part A

In [14]:
```
data = [87,103,130,160,180,195,132,145,211,105,145,153,152,138,87,99,93,119,129]
variance = statistics.variance(data)
stdev = statistics.stdev(data)
print("Variance: %0.4f Minutes" % (variance))
print("Standard Deviation: %0.4f Minutes" % (stdev))
```

```
Variance: 1264.7661 Minutes
Standard Deviation: 35.5635 Minutes
```

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Part B

Below are the results if the question was done in hours. They would merely be the above values but devided by 60.

In [15]:
```
print("Variance: %0.4f Hours" % (variance/60))
print("Standard Deviation: %0.4f Hours" % (stdev/60))
```

```
Variance: 21.0794 Hours
Standard Deviation: 0.5927 Hours
```

Problem 3

Part A

The outcomes are $A = \{SSF, SFS, FSS\}$

Part B

Event $B = \{SSF, SFS, FSS, SSS\}$

Part C

The event that the system function is $C = \{SFS, SSF, SSS\}$

Part D

$C' = 1 - C = \{FFF, FFS, FSF, FSS, SFF, SFS, SSF, SSS\} - \{SFS, SSF, SSS\}$
$= \{FFF, FFS, FSF, FSS, SFF\}$

$A \cap C = \{SSF, SFS, FSS\} \cap \{SFS, SSF, SSS\} = \{SSF, SFS\}$

$A \cup C = A + C - (A \cap C) = \{SSF, SFS, FSS\} + \{SFS, SSF, SSS\} - \{SSF, SFS\}$
$= \{SSF, SFS, FSS, SSS\}$

$B \cap C = \{SSF, SFS, FSS, SSS\} \cap \{SFS, SSF, SSS\} = \{SSF, SFS, SSS\}$

$B \cup C = B + C - (B \cap C) = \{SSF, SFS, FSS, SSS\} + \{SFS, SSF, SSS\}$
$- \{SSF, SFS, SSS\} = \{SSF, SFS, FSS, SSS\}$

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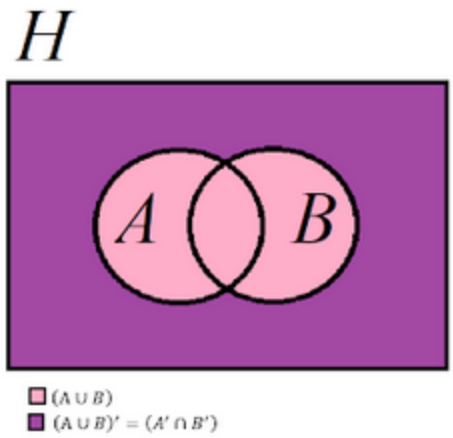
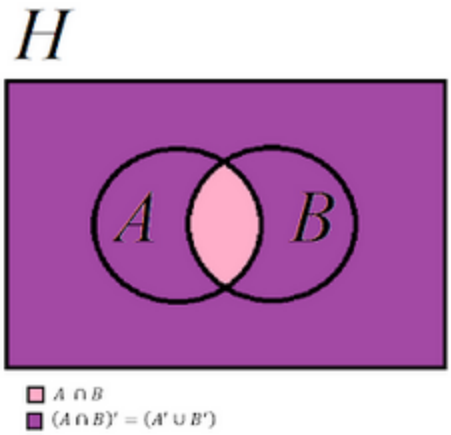
Problem 9

Part A



Part B



In [ ]: