Hw 1

1. Exercise 1.16

$$\sum_{i=1}^{n}(x_i-\bar{x}) = \sum_{i=1}^{n} x_i - \sum_{i=1}^{n}\bar{x}$$

$$= \sum_{i=1}^{n} x_i - \bar{x}\sum_{i=1}^{n} 1$$

$$= \sum_{i=1}^{n} x_i - \bar{x}n$$

$$= n\bar{x} - \bar{x}n = \boxed{0}$$

$$\sum_{i=1}^{n}(x_i-\bar{x})^2 = \sum_{i=1}^{n} x_i^2 - 2x_i\bar{x} + \bar{x}^2$$

$$= \sum_{i=1}^{n} x_i^2 - 2\bar{x}\sum_{i=1}^{n} x_i + \sum_{i=1}^{n}\bar{x}^2$$

$$= \sum_{i=1}^{n} x_i^2 - 2n\bar{x}^2 + n\bar{x}^2$$

$$\boxed{= \sum_{i=1}^{n} x_i^2 - n\bar{x}^2}$$

2. Exercise 1.21

```
> sort(x)
 [1]  13  15  18  21  21  21  22  22  24  28  28  37  40  43  50  55  66  69  70
[20]  74  74  78  78  83  83  87  89  90  93  95  96  98  98 102 103 112 112 115
[39] 118 120 121 124 132 135 158
> mean(x)
[1] 74.02222
> median(x)
[1] 78
> sd(x)
[1] 39.25759
>
```

```
> quantile(x)
  0%  25%  50%  75% 100%
  13   37   78  102  158
```

- Q1 = 37
- Q3 = 102
- IQR : 65
- $37 - (1.5 \times 65) = -60.5$
- $102 + (1.5 \times 65) = 199.5$
- there are NO Potential outliers

3. WMMY Exercise 2.6

- A_1A_2
- A_1A_3
- A_1A_4
- A_2A_3
- A_2A_4
- A_3A_4

4. WMMY Exercise 2.54

- $P(T) = 0.6$
- $P(M) = 0.3$
- $P(T \cap M) = 0.15$

A) $0.6 + 0.3 - 0.15 = \boxed{0.75}$

B) $1 - 0.75 = \boxed{0.25}$

5. WMMY Exercise 2.82

- $P(H) = 0.21$
- $P(W) = 0.28$
- $P(H \cap W) = 0.15$

A) $0.21 + 0.28 - 0.15 = \boxed{0.34}$

B) $P(W|H) = \frac{0.15}{0.21} = \boxed{0.714}$

C) $P(H|W') = \frac{0.06}{0.72} = \boxed{0.083}$

6. WMMY Exercise 2.96

$(0.4 \times 0.2) + (.3 \times .1) + (.2 \times .5) + (.3 \times .2)$

$= \boxed{0.27}$

7. WMMY Exercise 2.98

- $P(L_2 \mid T) = \dfrac{P(L_2)\,P(T \mid L_2)}{P(T)}$

$$= \frac{.3 \times .1}{.27}$$

$$= 0.11$$