Hao-HW2

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Setup.

```
library(VennDiagram)
```

2.6

```
combinations = expand.grid(seq(1,6), seq(1,6))
combinations$Total = combinations$Var1 + combinations$Var2
nrow(combinations[combinations$Total==5, ])
```

```
## [1] 4
```

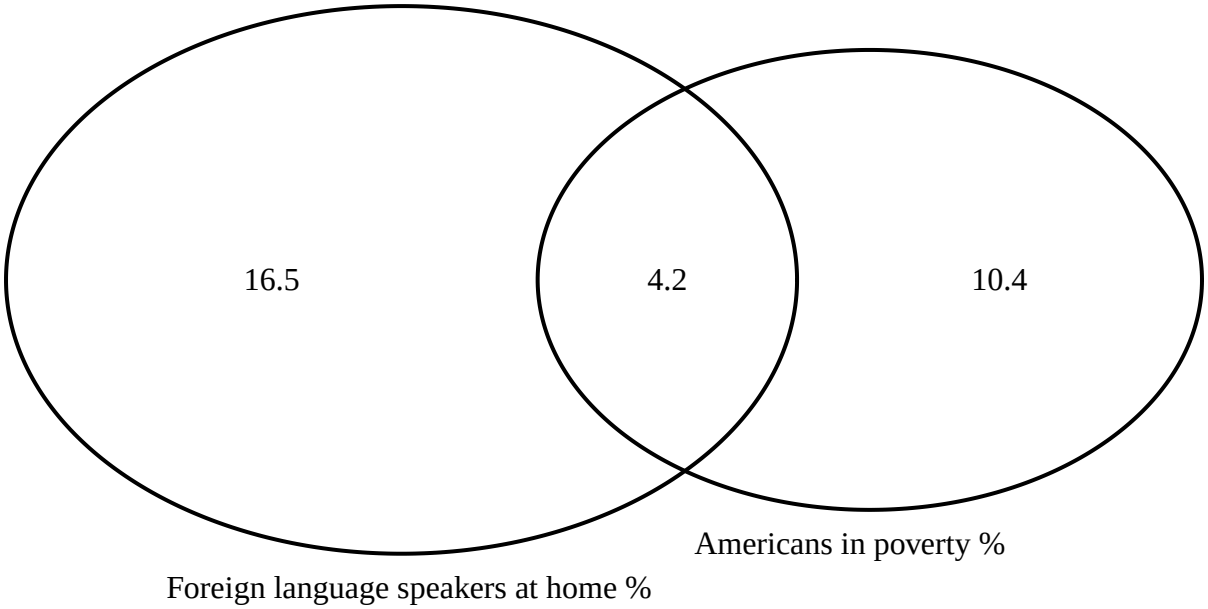
a) 0
b) $4/36 = 11.11\%$
c) $1/36 = 2.78\%$

2.8

a) No, disjoint outcomes are mutually exclusive.

b)

```
draw.pairwise.venn(area1 = 14.6, area2 = 20.7, cross.area = 4.2,
                   category = c('Americans in poverty %', 'Foreign language speakers at home %'),
                   cat.pos = c(3, -1))
```




```
## (polygon[GRID.polygon.1], polygon[GRID.polygon.2], polygon[GRID.polygon.3], polygon[GRID.polygon.4],
```

c) 10.4%
d) 16.5 + 4.2 + 10.4 = 31.1%
e) 100 - 31.1 = 68.9%
f) No, the probability of being below the poverty line is 14.6% for all Americans, but the probability of being below the poverty line given being a foreign language speaker at home is 4.2/20.7 = 20.29%

2.20

a) (114 + 108) / 408 = 54.41%
b) 78 / 114 = 68.42%
c) 19 / 54 = 35.19%; 11 / 36 = 30.56%
d) No, the color of the male's eyes affects the probability of having a partner with certain eye color.

2.30

a) 28/95 * 59/94 = 18.50%
b) 67/95 * 28/94 = 21.01%
c) 67/95 * 28/95 = 20.79%
d) When the sample size is a small fraction of the population, observations are nearly independent even when sampling without replacement.

2.38

a) 0 * 0.54 + 25 * 0.34 + 35 * 0.12 = $12.7 average revenue per passenger; 0.54*(0 - 12.7)^2 + 0.34*(25 - 12.7)^2 + 0.12*(35 - 12.7)^2 = $198.21 variance; 198.21^0.5 = $14.08 standard deviation
b) $12.7 * 120 = $1,524 revenue per flight; ($198.21 * 120)^0.5 = $154 standard deviation

2.44

a) The distribution is bell shaped with a minimum of zero and a fat right tail.
b) 62.2%
c) 62.2% * 41% = 25.5%; this assumes that gender and income are independent variables.
d) Based on the table below, 29.4% of femals earn less than $50K per year; thus, the assumption in part c is likely incorrect (but further analysis would be needed to answer this more concretely)

```
##           M    F Total
## <$50K  32.8 29.4  62.2
## >=$50K 26.2 11.6  37.8
## Total  59.0 41.0 100.0
```