Week 16.

1. Perfect Wheel.

given info. $p = \frac{18}{38} = 0,4737$

$\hat{p} = \frac{76}{152} = 0,5$

$n = 152$

a) $H_0 : p = 0,4737$

(in words, the wheel is perfectly balanced).

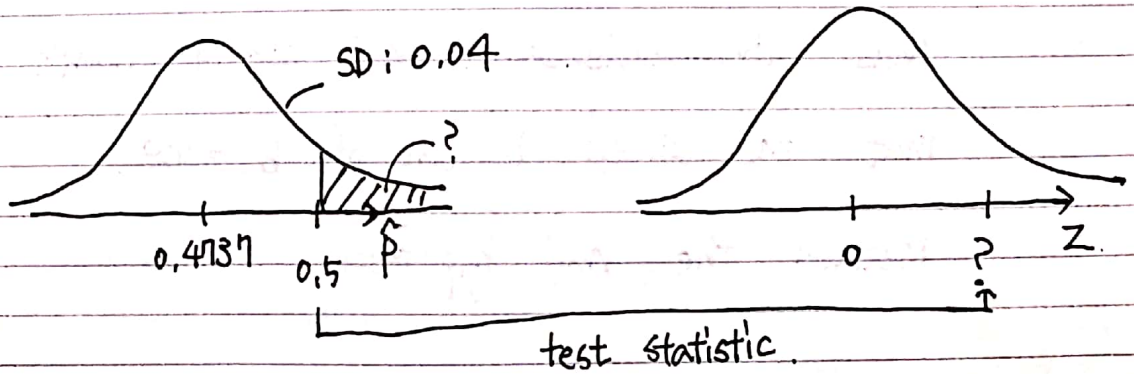
$H_A : p > 0,4737$

(in word, the wheel generates too many reds).

b) $SD(\hat{p}) = \sqrt{\frac{pq}{n}}$

$= \sqrt{\frac{0,4737 \times (1 - 0,4737)}{152}} = 0,04$

Note, if H_0 is true



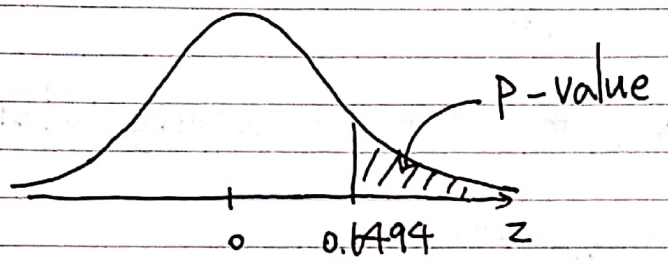
c)

$$\text{Test statistic} = \frac{\hat{p} - p}{SD(\hat{p})}$$

$$= \frac{0.5 - 0.4737}{0.04}$$

$$= 0.6494$$

d)



Look up 0.6494 in z table; p-value is 0.2578

e)

If the wheel is perfectly balanced, the chance of getting 76 reds on 152 spins is 0.2578, which is about 26%. This is not unlikely to happen if the wheel is perfectly balanced.

Thus, the evidence is not strong enough to conclude that the wheel is out of balance.

Retain the null hypothesis.

Problem 2. Average age of first marriage.

given info.

$\mu = 23.3$ $\quad \bar{y} = 24.2$ $\quad n = 40$.

$\sigma = X$ $\quad s = 5.3$

a) H_0: $\mu = 23.3$

(in words, 2014 population mean is 23.3).

H_A: $\mu > 23.3$

(in words, 2014 population mean is more than 23.3).

b) $SE(\bar{y}) = \frac{s}{\sqrt{n}} = \frac{5.3}{\sqrt{40}} = 0.838$

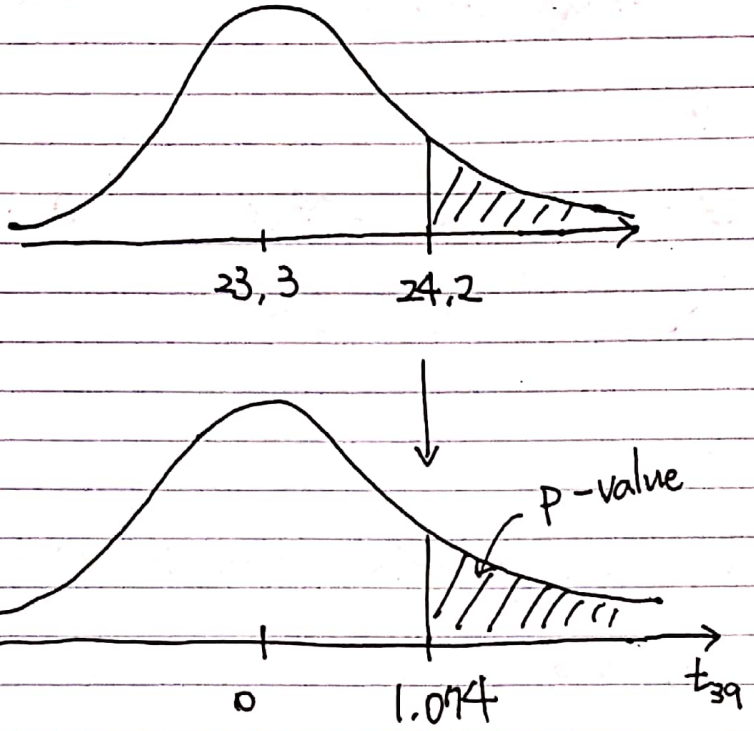
c) Test statistic $= \frac{\bar{y} - \mu}{SD(\bar{y})}$

$= \frac{\bar{y} - \mu}{\sigma/\sqrt{n}}$ (but we don't know σ, so we use s instead of σ)

$= \frac{24.2 - 23.3}{5.3/\sqrt{40}}$

$= \frac{24.2 - 23.3}{0.838} = 1.074$ ← Since we used "s" instead of "σ" this follows t dist, df = 39

d)

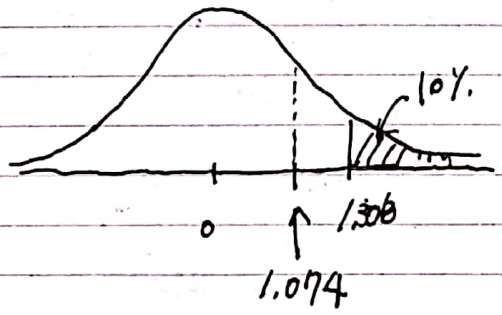


To calculate p-value look up t dist w/ df 39.

But there is no 39 df so we choose 35.

Since $1.074 < 1.306$, we can say p-value > 0.10.

Note that 1.306 is t score which corresponds to p-value 0.10.



e) Since p-value is larger than 0.05, we can not reject the null hypothesis. (we can say retain the null)