Rōsín Ní Bhrion: 18326577

Probability Assignment 1

1 (a) $n = 10$, $\bar{y} = 124$, $s = 10$

$H0: \mu = 110$, $HA: \mu \neq 110$, $\alpha = 0.01$

$\frac{\bar{y} - \mu_0}{s/\sqrt{n}}$ = test statistic

$\frac{124 - 110}{10/\sqrt{10}} = 4.427188724$

two sided test

$df = 9$ $\alpha/2 = 0.005$

$cv = 3.250$

Conclusion

$4.44272 \geq 3.250$

So $Tobs \geq t_{v,\alpha/2}$

∴ We Reject the H0 and accept the HA

1 (b) $n = 8, \bar{y} = 0.6, s = 0.2$

$H_0: \mu = 0.5, H_A: \mu \neq 0.5, \alpha\ 0.05$

$\frac{\bar{y} - \mu_0}{s/\sqrt{n}}$ = test statistic

$\frac{0.6 - 0.5}{0.2/\sqrt{8}} = 1.414213562$

two sided test

$df = 7$ $\frac{\alpha}{2} = 0.025$

$cv = 2.365$

conclusion

The test statistic is between $-cv$ and $+cv$

$-t_{v,\alpha/2} < t_{obs} < t_{v,\alpha/2}$

$-2.365 < t_{obs} < 2.365$

$\therefore$ We must fail to reject the H_0

1.

(a) $n = 25$, $\bar{y} = 33.4$, $s = 6.8$

$H_0 : \mu = 30$, $H_1 : \mu > 30$, $\alpha = 0.1$

$$\frac{\bar{y} - \mu_0}{s/\sqrt{n}} = \text{test statistic}$$

$$\frac{33.4 - 30}{6.8/\sqrt{25}} = 2.5$$

upper tailed test

$df = 24$ $\alpha = 0.1$

$CV = 1.318$

conclusion

$t_{obs} \geq t_{\nu, \alpha}$

$2.5 \geq 1.318$

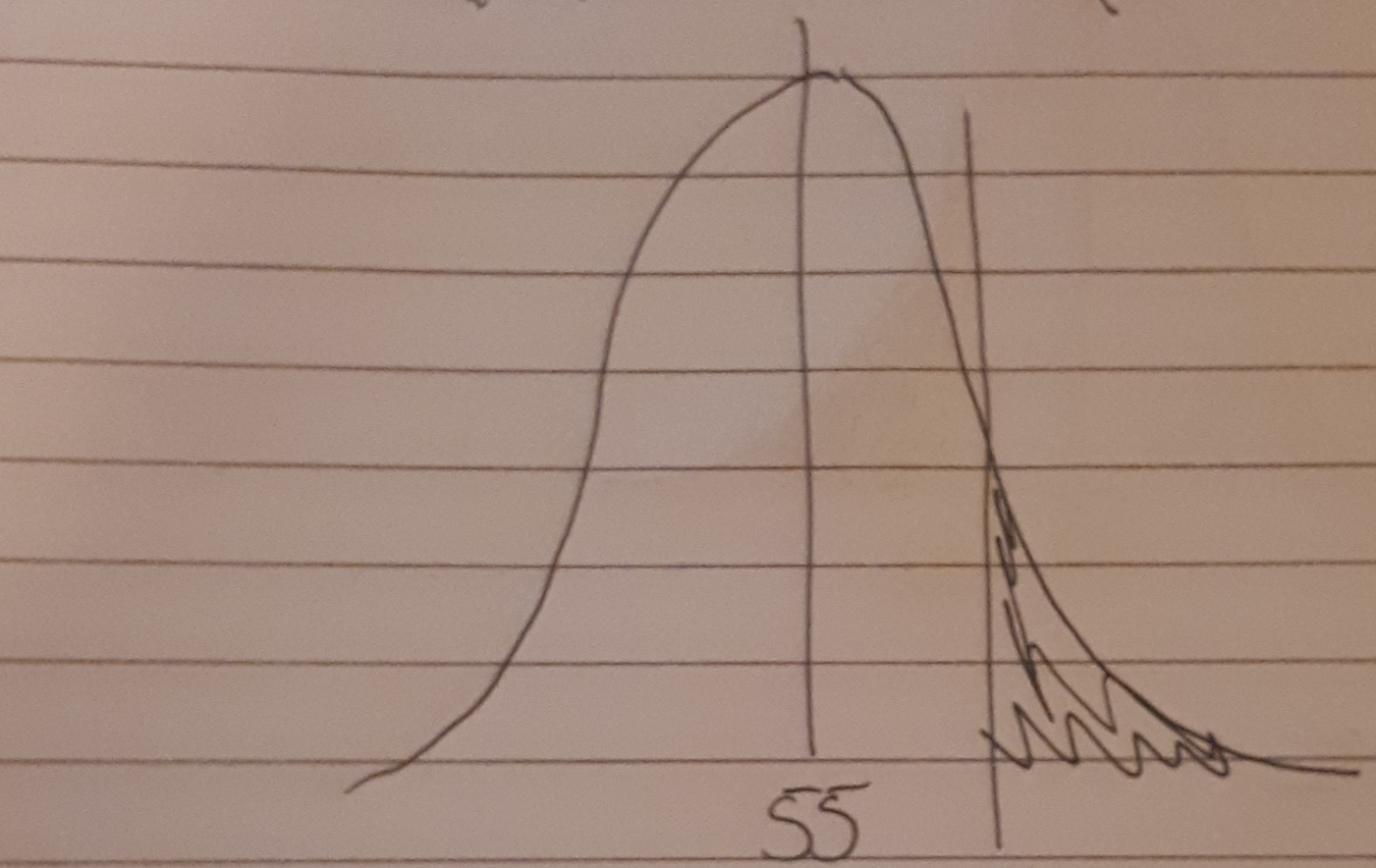
∴ We must reject the H_0 and accept the H_A

2. (a) $\mu = 55 \quad \sigma^2 = 100 \quad 10 = n$

$X \sim N(55, 100)$

$P(X \leq a) = \int_{-\infty}^{a} f(x)\,dx$

$1 - P(X \leq a) = P(x > a)$



$1 - P(x \leq 70) \qquad \frac{\bar{x} - \mu}{\sigma}$

$= \frac{70 - 55}{10} = 1.5$

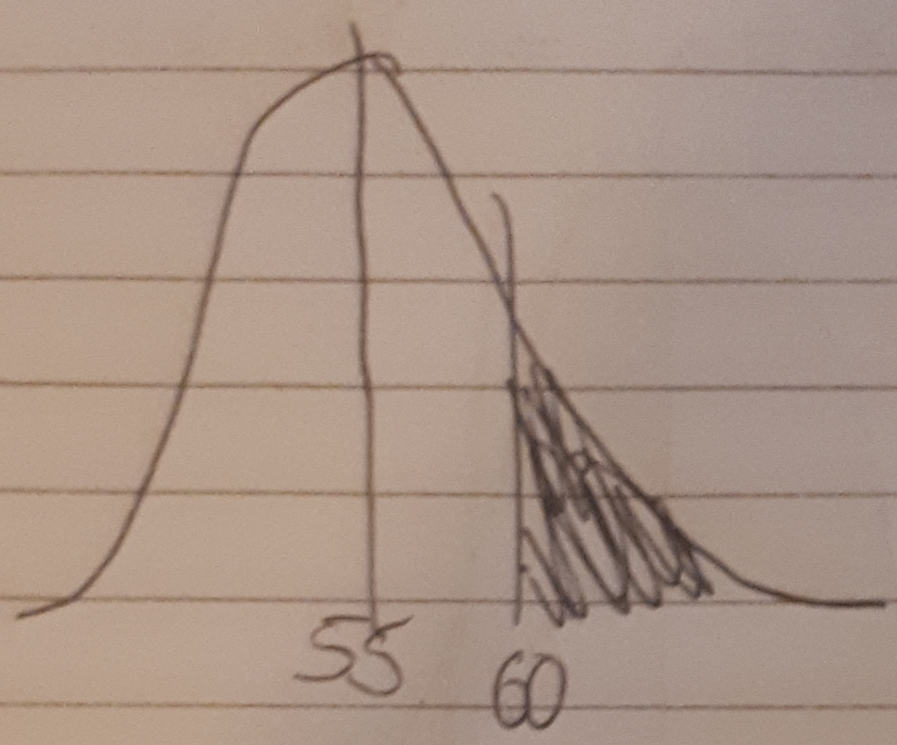
0.9332

$1 - 0.9332 = 0.0668$

(b) $\binom{10}{1}(0.0668)^1(0.9332)^9$

$= 0.35855$

(c)



$\frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$

$\frac{60 - 55}{\frac{10}{\sqrt{10}}} = 1.58114$

$1 - 0.9429 = 0.0571$