

Type I and type II error problems, ANSWERS.

type I error = $P(\text{reject the null} \mid \text{the null is true})$

type II error = $P(\text{accept the null} \mid \text{the null is false (some other particular value)})$

1.
 - a. $P(\text{sample mean} > 10 \mid \text{pop. mean} = 9.4) = .4\%$; $z = 2.67$
 - b. $P(\text{sample mean} < 10 \mid \text{pop. mean} = 9.8) = 81.595\%$; $z = 0.889$
 - c. $P(\text{sample mean} < 10 \mid \text{pop. mean} = 10.3) = 8.85\%$; $z = -1.333$
2.
 - a. $P(\text{sample } \% < .46 \mid \text{pop. } \% = .5) = 1.22\%$; $z = -2.26$
 - b. $P(\text{sample } \% > .46 \mid \text{pop. } \% = .44) = 12.505\%$; $z = 1.14$
3.
 - a. 52.2863
 - b. 5%
 - c. $P(\text{sample avg.} < 52.2863 \mid \text{pop. avg.} = 54) = 10.565\%$; $z = -1.237$
 $P(\text{sample avg.} < 52.2863 \mid \text{pop. avg.} = 56) = 0.345\%$; $z = -2.68$
4.
 - a. 43.64%
 - b. $P(\text{sample } \% < .4364 \mid \text{pop. } \% = .42) = 85.315\%$; $z = 1.05$
 $P(\text{sample } \% < .4364 \mid \text{pop. } \% = .47) = 1.58\%$; $z = -2.13$
 - c. $100\% - 1.58\% = 98.42\%$
5. two-tailed!
 - a. $z = 1.95$; critical values = 1618.532 and 1681.468
 - b. $P(1618.532 < \text{sample mean} < 1681.468 \mid \text{pop. mean} = 1700) \simeq 12.5\%$
6.
 - a. $P\text{-value} = 2.56\%$; Reject the null
 - b. critical value = 207.44; Reject H_0 if sample avg. < 207.44
 - c. $P(\text{sample avg.} > 207.44 \mid \text{pop. avg.} = 202) = 0.0235\%$; $z = 3.5115$
7.
 - a. critical value = 0.7867 = 78.67%; Reject H_0 if sample $\% > 78.67\%$
 - b. $P(\text{sample } \% < 0.7867 \mid \text{pop. } \% = .8) = 29.115\%$; $z = -0.5257$
8. Can't do without SD. Assume, $s = 10$
 - a. critical value = 33.31; Reject H_0 if sample avg. < 33.31
 - b. $P(\text{sample avg.} > 33.31 \mid \text{pop. avg.} = 40) = 99.99955\%$; $z = -4.438$