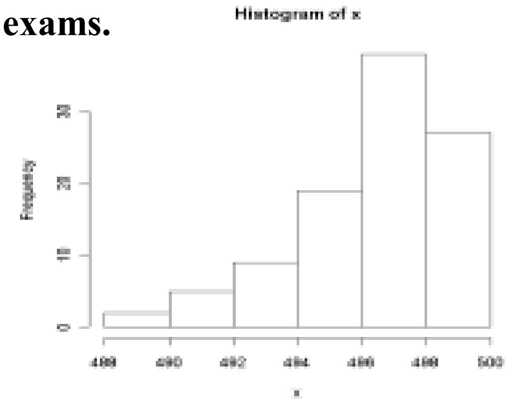
Some extra final exam practice from the first two+ exams.



1) (Circle the correct answers) The histogram at the right is **skewed left** / **symmetric** /**skewed right**.
We would expect that its mean would be
larger than / **smaller than** /**equal to** its median.

2) A fair coin (probability of a head on one flip = 0.5) is flipped 10 times. What is the probability of observing exactly 5 heads?

3) A certain shortstop in major league baseball has a 98.2 percent chance of successfully making plays in the field. If we assume that each play is independent of the others, what is the chance that this shortstop will successfully make all of the next 100 plays?

4) A display is being used to represent the populations of the various states graphically. A square 1" on a side is being used to represent the population of South Carolina (3.8 million). What dimensions would the square being used to represent Georgia (7.6 million people) need to have? ______________________.

5) In a particular desert, the probability of it raining on a particular day is 0.02. The probability of the temperature exceeding 100 degrees is 0.50. If precipitation and temperature are independent, then the probability of it both raining and being over 100 degrees is _________________. If having precipitation and temperatures exceeding 100 degrees are mutually exclusive, then the probability of it both raining and being over 100 degrees is _________________.

6) A lottery game is set up so that there are two levels of prizes. There is a 1 in 500,000 chance of winning $100,000, and a 1 in 100,000 chance of winning $10,000. What is the expected value of one ticket for this lottery?

7) P(A)=0.5, P(B)=0.2. If A and B are mutually exclusive, what is P(A∪B)?
If A and B are independent, what is P(A∪B)?

8) A random sample of 384 men in 1984 found an average weight of 158 pounds, with a standard deviation of 29 pounds. A follow up study in 1998 was conducted on 286 men. The average weight of this new sample was 164 pounds with a standard deviation of 34 pounds. It is desired to see if the average male weight has increased between 1984 and 1998.

A) State the appropriate null and alternate hypotheses.
B) Perform the appropriate hypothesis test and state your conclusion at α=0.05.
C) Construct a 95% confidence interval for the change in the average male weight.
D) State the assumptions required for trusting your answers to parts b and c.

Answers to "Some extra final practice from the first two+ exams."

1) The histogram at the right is **skewed left.** We would expect that its mean would be **smaller than** its median.

2) A fair coin (probability of a head on one flip = 0.5) is flipped 10 times. What is the probability of observing exactly 5 heads?

$$\binom{10}{5}0.5^5(1-0.5)^5 = \frac{10!}{5!5!}0.5^{10} = 252(0.000976562) \approx 0.2461$$

3) A certain shortstop in major league baseball has a 98.2 percent chance of successfully making plays in the field. If we assume that each play is independent of the others, what is the chance that this shortstop will successfully make all of the next 100 plays? **$(0.982)^{100}$= 0.1626 = 16.26%**

4) A display is being used to represent the populations of the various states graphically. A square 1" on a side is being used to represent the population of South Carolina (3.8 million). What dimensions would the square being used to represent Georgia (7.6 million people) need to have? **Square root of two inches (approx. 1.41") on a side, so that the area for Georgia is twice the area for South Carolina.**

5) In a particular desert, the probability of it raining on a particular day is 0.02. The probability of the temperature exceeding 100 degrees is 0.50. If precipitation and temperature are independent, then the probability of it both raining and being over 100 degrees is **0.50 * 0.02 = 0.01**.. If having precipitation and temperatures exceeding 100 degrees are mutually exclusive, then the probability of it both raining and being over 100 degrees is **0**.

6) A lottery game is set up so that there are two levels of prizes. There is a 1 in 500,000 chance of winning $100,000, and a 1 in 100,000 chance of winning $10,000. What is the expected value of one ticket for this lottery? **$100,000*1/500,000 + $10,000*1/100,000 + $0*499,994/500,000 = $0.20+$0.10 = $0.30**

7) P(A)=0.5, P(B)=0.2. If A and B are mutually exclusive, what is P(AUB)? **P(A)+P(B)-P(A∩B)=0.5+0.2-0=0.7**
If A and B are independent, what is P(AUB)? **P(A)+P(B)-P(A∩B)= P(A)+P(B)-P(A)P(B|A)= P(A)+P(B)-P(A)P(B)=0.5+0.2-0.5*0.2=0.7-0.1=0.6**

8) A random sample of 384 men in 1984 found an average weight of 158 pounds, with a standard deviation of 29 pounds. A follow up study in 1998 was conducted on 286 men. The average weight of this new sample was 164 pounds with a standard deviation of 34 pounds. It is desired to see if the average male weight has increased between 1984 and 1998.
A) State the appropriate null and alternate hypotheses, being sure to identify the parameters you use.
H_0: $\mu_{84}=\mu_{88}$ vs. H_A: $\mu_{84}<\mu_{88}$ where μ_{84} is the average weight of all men in 1984 and μ_{88} is the average weight of all men in 1988.

B) Perform the appropriate hypothesis test and state your conclusion at α=0.05.

$$s_p^2 = \frac{(n_{84}-1)s_{84}^2 + (n_{88}-1)s_{88}^2}{n_{84}+n_{88}-2} = \frac{(384-1)29^2 + (286-1)34^2}{384+286-2} = 975.4$$

$$t = \frac{\bar{x}_{84} - \bar{x}_{88} - (\mu_{84}-\mu_{88})}{\sqrt{\frac{s_p^2}{n_{84}} + \frac{s_p^2}{n_{88}}}} = \frac{158-164-(0)}{\sqrt{\frac{975.4}{384} + \frac{975.4}{286}}} = \frac{-6}{2.44} = -2.46$$

We compare this to -1.645 and fail to reject. We reject the null hypothesis and conclude there was a change.

C) Construct a 95% confidence interval for the change in the average male weight.

$$\bar{x}_{84} - \bar{x}_{88} \pm t_{\alpha/2}\sqrt{\frac{s_p^2}{n_{84}} + \frac{s_p^2}{n_{88}}} \Rightarrow -6 \pm 1.96(2.44) \Rightarrow -6 \pm 4.78 \Rightarrow (-10.78, -1.22)$$

D) State the assumptions required for trusting your answers to parts b and c.
Two independent random samples. Both populations normal. Both populations have equal variances.