

STAT 302H**Midterm Exam #1****Spring 2007**

1. Many characteristics are inherited as a result of the genetic make-up of an offspring's two parents and the environmental exposures experienced during prenatal development. Birth weight is one of these characteristics. The table below lists the probability distribution for birth weights (in pounds) of children that go to full term before delivery.

<u>Birth Weight</u>	<u>Probability</u>
5.00- 5.99	0.05
6.00- 6.99	0.10
7.00- 7.99	0.30
8.00- 8.99	0.34
9.00- 9.99	0.14
10.00-10.99	0.04
11.00-11.99	0.02
12.00-12.99	0.01

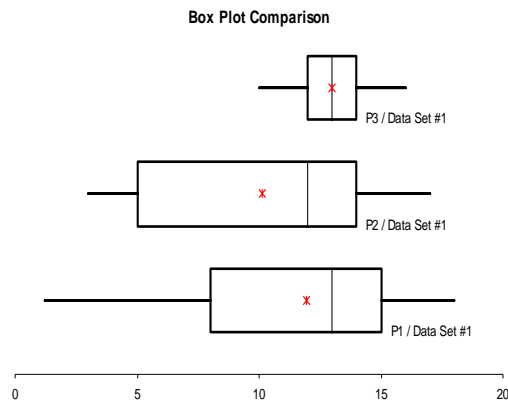
- Find the mean birth weight.
 - What is the probability of a child being born with a birth weight greater of at least 8 lbs?
 - How would you expect the probability distribution for children who were born prematurely to differ from the distribution given in this problem? Why?
2. I am interested in determining what proportion of people in Texas support the ban of the use of federal money for stem cell research. Before I run my study, I would like to see what the probability of certain types of results might be if I am correct about the true proportion of the population who support the ban. It is my contention that only 25% of the state support the ban.
- Assuming I run a study asking 15 people, what would be the probability that no one person supports the ban?
 - Assuming I run a study asking 15 people, what would be the probability that at most one person supports the ban?
 - Assuming that I run a study with 1,000 people instead of 15, what would be the probability that less than half the people support the ban?
3. Although the high tide levels on the Texas coast are quite small, it is still very important to determine them accurately because the average high tide level is used to determine the property line along the coast and, thus, the oil rights associated with the property. High tide levels can be sampled to estimate the average high tide for a property, and the levels are measured in inches above normal.
- Assuming that I need a 95% confidence interval to have a width of 2.5 inches to produce a sufficiently accurate estimate to make a legal claim, what size sample should I take if the variance of the high tide levels is 30?
 - Assume for this part that I did not use *any* of the information in part (a), but instead just took a sample of five high tide levels and got the following five values: 5, 22, 15, 20, 12. Find a 95% confidence interval for the mean high tide level.
 - I claim is that my property's average high tide level is 7 inches. Do the data in part (b) support my claim? Are you comfortable with your conclusion? Why?

4. I have been given 5 one-gallon samples of sludge that I am to use to compare two different bioremediation techniques. The data come from a park management group who wishes to know which technique to use to remediate a large portion of their park that has been contaminated. I have decided to run the following experiment. I will take each gallon container and thoroughly stir it to completely mix the sample. I will then divide it into two separate, equal sized containers and use Technique A on one container and Technique B on the second container. I will do this for each of the 5 one-gallon samples. After 72 hours, I will measure the oxygen level on the container, where the higher the oxygen level the better the remediation treatment worked. The data are listed below:

Technique A: 45 43 36 45 46

Technique B: 39 40 38 44 40

- Determine the null and alternative hypothesis that is to be tested.
 - Compute an interval estimate of the mean difference between the two techniques.
 - Test the hypotheses stated in part (a) at the 0.05 level.
 - What would you recommend to the park management group? Why?
5. Box plots of three different groups of diet programs are displayed below. The data represent weight loss over a 12 week period.



- Which plot(s) appears to look like it comes from a normal distribution? Why?
- Which plot(s) looks to represent a skewed sample? Why?
- Which diet program appears to have been most effective? Why?