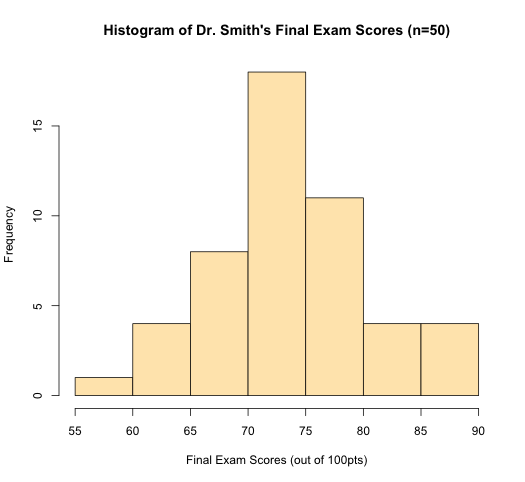
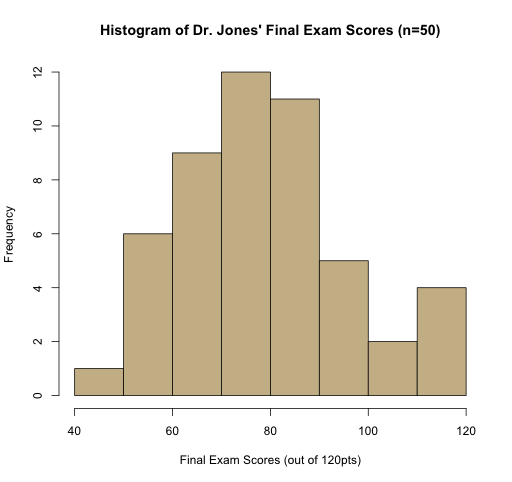
**Normal Distributions**

Let’s say you are trying to decide whether to take statistics from one of two professors—Dr. Smith and Dr. Jones. Both professors assign A’s to students scoring 90 points and above and F’s to students scoring 60 points and below on the final exam.

Suppose the distribution of scores on Dr. Smith’s final exam has a bell-curved shape, with a mean of 74 points and a standard deviation of 7 points.



Suppose the distribution of scores on Dr. Jones’ exam is also bell-curved, with a mean of 78 points and a standard deviation of 18 points.



**Discuss the Following Questions**

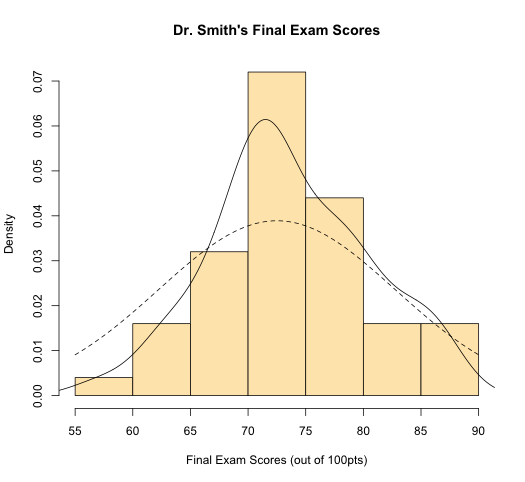
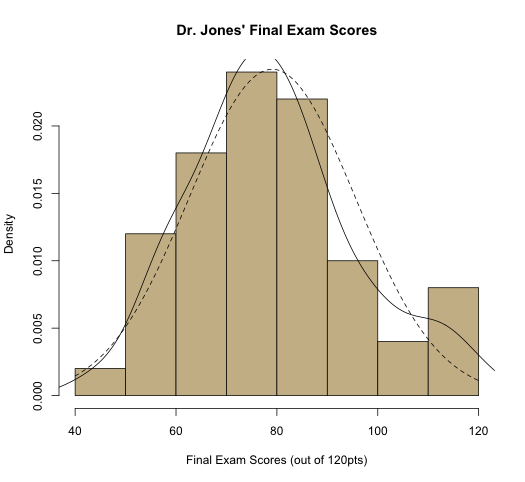
Without doing any calculations, please attempt to answer the following questions.

1. Which professor would assign more A’s? Why?
2. Which professor would assign more F’s? Why?
3. Based only on the information above, from which professor would you rather take a course? Why?

The above histograms are a useful way of visually examining a distribution of a variable. However, smoothing a histogram helps us to see the shape of the distribution with less jagged edges. Once a histogram is “smoothed”, you can use a density curve as a model for the underlying distribution of the variable. The density curves are meant to mimic a real-life process and help us find probabilities of an event occurring.

There are many theoretical distributions that can be used to model data. One of the most widely used density models is called a normal distribution.

The first graphs impose a density curve (black line) over the histograms for each of the professors. The second graphs then impose a normal density curve (dotted black line) over the distribution.

** **

1. Does it appear that the normal model does a good job of approximating each distribution? Explain.

**NORMAL DENSITY CURVE**

Use a normal density curve to learn more about the final exam grade distributions in Dr. Smith’s and Dr. Jones’ class.

* Open a web browser and go to <http://lock5stat.com/statkey>.
* Click on the link *Normal*.

You will first be answering questions for Dr. Smith’s class.

* Click on the button *Edit Parameters* on the right-hand side of your screen.
* Enter in Dr. Smith’s class mean and standard deviation in the text boxes in the window and then click Ok*.*

1. Determine the proportion of A’s given in Dr. Smith’s class. What is it?
2. Determine the proportion of F’s given in Dr. Smith’s class. What is it?

Next you will be answering questions for Dr. Jones’ class.

* Change the parameters in the Normal model to reflect Dr. Jones’ class grade distribution.

1. Determine the proportion of A’s given in Dr. Jones’ class. What is it?
2. Determine the proportion of F’s given in Dr. Jones’ class. What is it?
3. Which professor gives the highest proportion of A’s?
4. Which professor gives the highest proportion of F’s?
5. Do the results you got using StatKey confirm the predictions you made earlier in questions 1 and 2?

**STANDARD NORMAL DISTRIBUTION**

Suppose you are in Dr. Smith’s class and your friend is in Dr. Jones’ class. You received an 80 points on your final exam (which was out of 100 points) and your friend received a 100 points on his final exam (which was out of 120 points). You are interested in knowing who scored higher within their class.

1. Are you able to compare the two scores as they are right now? Why or why not?
2. What is the z-score for your final exam score?
3. How do you interpret your z-score value?
4. What is the z-score associated with your friend’s final exam score?
5. How do you interpret your friend’s z-score value?
6. Are you able to compare these two transformed scores? Why or why not?
7. Who had the higher score within their class?
8. What proportion of scores lie below your score?
9. What proportion of scores lie below your friend’s score?