NYCCT MAT1372 Halleck Fall 2018 Practice exam 3

* You can only use a graphing calculator. Excel or R will not be allowed.
* You may use a formula sheet (1 sheet, 2 pages, hand-written).
1. (25 pts) The playing time for high school basketball player Jan is a continuous random variable Y defined by a density function which is 0 except between 30 and 60 minutes, where it has the form of an isosceles triangle (symmetric with peak at 45).
	1. Draw a graph of the density function and find the height of the triangle
	2. What is the chance that Jan will play between 35 and 45 minutes?
2. Shade and label the appropriate region of the graph for P(35<Y<45) and guess the probability by looking at the shaded graph.
	* + - 1. Find the probability. Does your answer more or less match what you guessed?
	1. Jan has a 90% chance of playing above how many minutes?

i. Make a new drawing of the distribution and shade and label the appropriate region of the graph and guess the x-value.

* + - * 1. Find the x-value. Does your answer more or less match what you guessed?
1. (25 pts) A poll (Tuesday 11/24/15):

http://www.quinnipiac.edu/news-and-events/quinnipiac-university-poll/iowa/release-detail?ReleaseID=2305

had Trump leading the Iowa Caucus 25% to Rubio’s 23%. However, the lead was within the claimed margin of error of ± 4%. Focus just on Trump’s numbers.

* 1. Find the standard deviation for whether one Iowa caucus voter is a supporter of Trump or not.
	2. Given that the sample size was 600, find the standard error (the standard deviation for the sample mean). Draw the appropriate normal curve and label the horizontal axis with both $\overbar{X}$ and Z labels.
	3. The margin of error is approximately ± twice the standard error. Find it. Was it roughly what the polltakers claim?
	4. By what factor did the sample size need to be increased (assuming that results would stay the same) for us to conclude that Trump was definitely leading.
1. (25 pts) A previous sample of fish in Lake Michigan indicated that the polychlorinated biphenyl (PCB) concentration per fish was distributed normally and that its mean was 11.2 parts per million with a standard deviation of 2 parts per million. Suppose a new random sample of 10 fish has the following concentrations:

11.5, 12.0, 11.6, 11.8, 10.4, 10.8, 12.2, 11.9, 12.4, 12.6

Assume that the standard deviation has remained equal to 2 parts per million.

* 1. Why do we need to know that the distribution X is itself normal?
	2. Find the standard error for the sample mean.
	3. Find and draw the curve for the 90th confidence interval for the sample mean. Be sure to label the horizontal axis with both $\overbar{X}$ and Z labels.
	4. Is the old concentration within this confidence interval?
	5. Do you think that the concentration has changed?
1. (25 pts) Orelia claims that she is able to produce larger tomatoes than average. She plants a tomato variety that results in tomatoes with mean diameter of 8.2 centimeters and standard deviation 2.4 centimeters. A sample of 36 of her tomatoes yields a sample mean of 9.1 centimeters.
2. Why do we NOT need to know that the distribution X is normal or not?
3. Find the standard error for the sample mean.
4. Draw the curve for the sample mean. Label the horizontal axis with both $\overbar{X}$ and Z labels.
5. Find 95th percentile for the same mean. Shade a label the region.
6. Mark our sample mean of 9.1. Does it lie in the tail outside the shaded region?
7. Do you think that Orelia’s claim is true?
8. (25 pts) Airplanes have a harder time lifting off in the thinner air of high-elevation airports. Weights of passengers including their luggage are normally distributed with an average of 210 pounds and standard deviation of 40. A 20-passenger plane can safely take off from Denver with at most 4400 lbs of passengers and cargo. Our plane has the maximum number of passengers allowed.
9. Why do we need to know that the distribution X is normal?
10. Find the standard error for $\hat{X}$.
11. Draw the curve for $\hat{X}$. Label the horizontal axis with both $\hat{X}$ and Z labels.
12. What is the chance that the plane will be over the safe limit for takeoff?
13. Suppose that you want to reduce the risk of being over the limit to 1%, what should the maximum allowed number of passengers be for this flight?