Math 153 - Quiz 9

April 23, 2015

Name key

Score

Show all work to receive full credit. Supply explanations when necessary.

1. (6 points) A manufacturer of pain reliever tablets claims that the tablets have a mean weight of 250 mg with a standard deviation of 4 mg. You select a random sample of 35 tablets.

   (a) What is the probability the mean weight of the sample is less than 248 mg?

   normalcdf$(-99999, 248, 250, 4/\sqrt{35}) \approx 0.0015$

   (b) If your sample actually had a mean weight of 247.6 mg, what conclusion would you draw?

   normalcdf$(-99999, 247.6, 250, 4/\sqrt{35}) \approx 0.0002$

   THIS IS EXTREMELY UNLIKELY. I WOULD DOUBT THE MANUFACTURER'S CLAIM.

   (c) What is an unusually small mean weight?

   $250 - 2\left(\frac{4}{\sqrt{35}}\right) \approx 248.65$ mg

   (d) Explain why the Central Limit Theorem applies in this problem.

   $N = 35 > 30$

2. (4 points) While calibrating a speed radar gun, a police officer has determined that at speeds near 70 mph, the errors in detected speeds are approximately normally distributed with mean 2.42 mph and standard deviation 0.36 mph. After working a speed trap along the expressway for several days, the police officer chooses a random sample of 10 speeds that were recorded with the radar gun.

   (a) About how many of those speeds would be in error by more than 2.75 mph?

   $10 \times$ normalcdf$(2.75, 99999, 2.42, 0.36) \approx 1.80$ About 2

   (b) What is the probability that the mean error in those speeds is greater than 2.75 mph?

   normalcdf$(2.75, 99999, 2.42, 0.36/\sqrt{10}) \approx 0.0019$

   (c) Explain why the Central Limit Theorem applies in this problem.

   ERRORS ARE NORMALLY DISTRIBUTED