

Instructions: This is a closed-book and closed-notes exam. Write clear and organized solutions for full credits. All the intermediate steps should be presented in your solution as well as the final answer. Please indicate your final answer by marking it with a circle or a box.

1.- A study reports that teenagers spend an average of 31 hours a week online and texting. Assume that this is the population mean μ . Assume also that the population standard deviation is $\sigma = 7$ hours. If a random sample of size $n = 64$ is selected, what is the probability that $\bar{x}$ is no more than 30?

$n = 64$, $\sigma = 7$ $\bar{x}$ is no more than 30

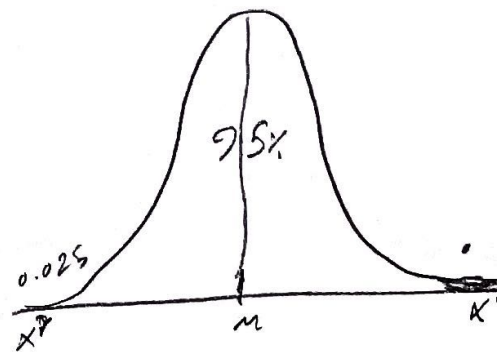
$\mu = 31$

$$z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}} = \frac{30 - 31}{7 / \sqrt{64}} = -1.14 \Rightarrow 0.1271 \checkmark$$

What is the probability $\bar{x}$ will fall in the interval from 30 to 33 hours?

If London authorities prepare for flood conditions when the monthly precipitation falls in the lower 7% of the normal June amounts, how much rain would have to fall to raise local authorities to take flood preparations?

Suppose that a particular city has received 2.3 inches of rain during June of last year. The average monthly rainfall level is 3.0 inches. Between what two values will you find the central 95% of the sample means $\bar{x}$?



2.- According to British weather forecasters, the average monthly rainfall in London during the month of June is $\mu = 2.09$ inches. Assume the monthly precipitation is a normally-distributed random variable with a standard deviation of $\sigma = 0.48$ inches. What is the probability that London will have between 1.3 and 2.1 inches of precipitation next June?

1.3 and 2.1 $\sigma = 0.48$ $\mu = 2.09$

What is the probability that London will have 1.4 inches or less of precipitation?

If London authorities prepare for flood conditions when the monthly precipitation falls in the upper 7% of the normal June amounts, how much rain would have to fall to cause local authorities to begin flood preparations?

Suppose that a particular year London received 3.3 inches of rain during June. That same year, Manchester received a total of 3.58 inches of rain. The city of Manchester has an average monthly rainfall in June with a mean $\mu = 2.49$ inches of $\sigma = 0.53$ inches. Which city experienced more unusual rainfall levels during that month? Explain why and justify with calculations.

4.- A focus group was organized by Procter and Gamble to receive feedback about a new product development. Ten participants were selected, and it was determined in a previous study that about 20 percent did not approve of the product.

What is the probability that none of the participants will not like the product?

What is the probability that exactly 2 of the participants will not like the product?

What is the probability that two or less of the participants will not like the product?

What is the probability of more than two participants during a day?

What is the probability that three or more participants will not like the product?

What is the expected number of participants that will not like the product?

Calculate the variance and standard deviation for this random variable.

5.- According to the National Oceanic and Atmospheric Administration (NOAA), the state of Colorado averages 18 tornadoes every June (NOAA website, November 8, 2012). Hint: There are 30 days in June. What is the mean number of tornadoes per day?

$$= \frac{18}{30} = 0.6 \checkmark$$

tl

What is the probability of no tornadoes in a given day? $n = 30, 18$

$$f(x) = \binom{n}{x} e^x (1-e)^{n-x}$$

$$f(0) = \binom{30}{0} 0.6^0 (1-0.6)^{30-0} = \underline{\quad}$$

What is the probability of exactly one tornado during a day?

$$f(1) = ? \underline{\hspace{2cm}}$$

What is the probability of more than one tornado during a day?

$$f(0), (1) \underline{\hspace{2cm}}$$

6.- The distribution of the price of a given stock traded at the NYSE is given in the following table:

Price	Probability
\$14.65	0.15
\$15.20	k
\$14.85	0.22
\$14.60	0.18

a) What value of k makes this a valid probability distribution?

b) Calculate the expected price for this stock.

7.- A store sells twenty similar items of which each item has probability 5% of being defective. The distribution that best describes this scenario is:

- ✕
- a) A Poisson distribution with parameter $\lambda = 5$.
 - b) A Normal distribution with parameter $\mu = 20$ and $\sigma = 0.05$
 - ✓ ☒ c) A Binomial distribution with parameters $n = 20$ and $p = 0.05$.
 - d) An Exponential distribution with parameter $\lambda = 0.05$.

8.-News Channel 6 did an interview outside of Ingram Mall asking people if they approve or disapprove of our current president. 63% of respondents disapprove of the president's performance. What can be said about the methods of this survey?

- a) Since it is stratified sampling it can be good when working with heterogeneous populations
- ✕ b) Since it is a convenience sample it might not be representative of the population
- ☒ c) Since it is simple random sampling it gives a good representation of the population
- d) Since it is systematic sampling this method might not work well with periodic data
- e) Since it is cluster sampling this method would be more suitable for neighborhood interviews