

Some Review Problems for Final Exam: Sampling Distributions

1. A candy manufacturer produces bags of jelly beans. The weight of a bag of jelly beans is normally distributed with a mean of 12 ounces and a standard deviation of 0.4 ounces.

(a) What is the probability that a randomly selected bag weighs between 11.62 and 12.3 ounces?

(b) 96% of the bags of jelly beans weight more than ___ ounces ?

If a random sample of 16 bags of jelly beans is selected ...

(c) what is the probability that the sample mean will be between 11.62 and 12.3 ounces?

(d) what is the probability that the sample mean will be above 12.2 ounces?

2. A company produces steel chains with an average breaking strength of $\mu=200$ lbs with $\sigma=10$ lbs.

(a) What is the probability that a randomly selected chain has a breaking strength of 195 lbs or less?

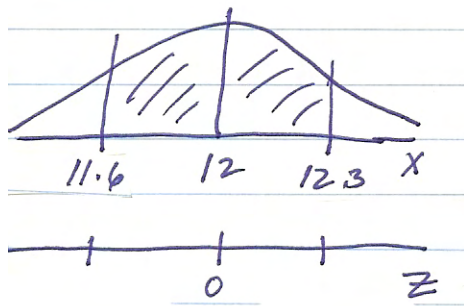
(b) Suppose you take a sample of $n=100$ chains. What is the probability that the sample mean breaking strength will be: 195 lbs or less?

(c) 201 lbs or more?

Answers

1.

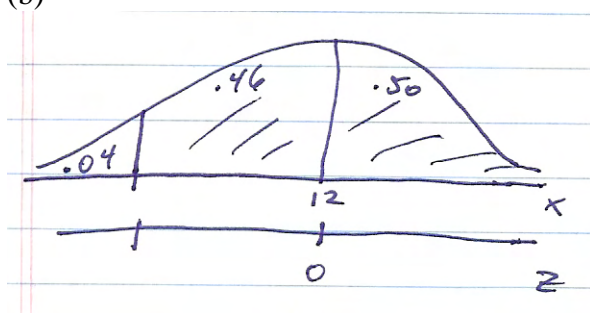
(a)



$$Z = \frac{11.62 - 12}{.4} = -0.95 \quad Z = \frac{12.3 - 12}{.4} = 0.75$$

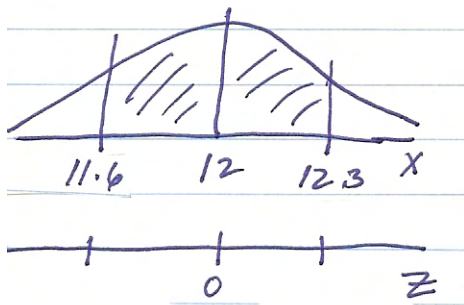
$$p = .3289 + .2734 = \boxed{.6023}$$

(b)



$$Z = -1.75 = \frac{X - 12}{.4} ; X = \boxed{11.3}$$

(c)

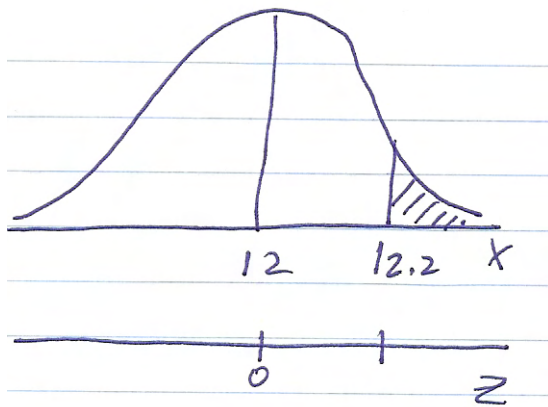


$$Z = \frac{11.62 - 12}{\frac{.4}{\sqrt{16}}} = -3.8$$

$$Z = \frac{12.3 - 12}{\frac{.4}{\sqrt{16}}} = 3$$

$$p = .49993 + .49865 = \boxed{.99858}$$

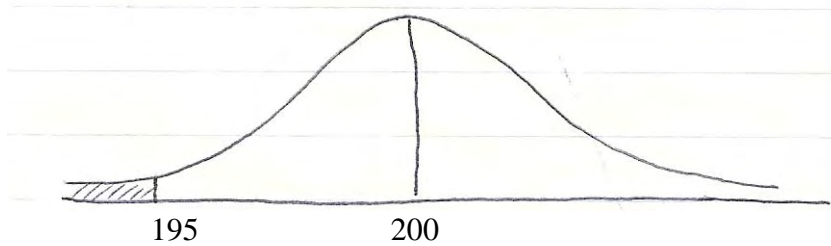
(d)



$$Z = \frac{12.2 - 12}{\frac{.4}{\sqrt{16}}} = 2.0$$

$$p = .50 - .4772 = \boxed{.0228}$$

2.



$$(a) \quad Z = \frac{195 - 200}{10} = -0.5 \quad \text{prob} = .5000 - .1915 = \boxed{.3085}$$

$$(b) \quad Z = \frac{195 - 200}{\frac{10}{\sqrt{100}}} = -5 \quad \boxed{\text{prob} < .0000}$$

$$(c) \quad Z = \frac{201 - 200}{\frac{10}{\sqrt{100}}} = 1 \quad \text{prob} = .5000 - .3413 = \boxed{.1587}$$