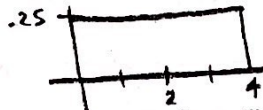


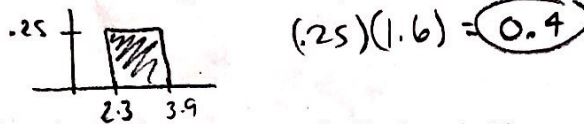
Show work. For each problem, include a labeled/shaded graph.

1. Assume that temperature readings are uniformly distributed between 0 and 4.

(a) Draw a uniform distribution for this situation.



(b) Find the probability that one randomly selected temperature reading will be between 2.3 and 3.9.

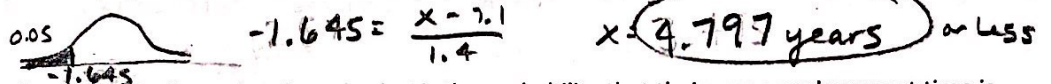


2. Replacement times for CD players are normally distributed with a mean of 7.1 years and a standard deviation of 1.4 years.

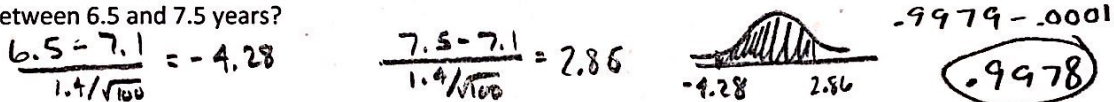
(a) Find the probability that a randomly selected CD player will have a replacement time less than 8.0 years.



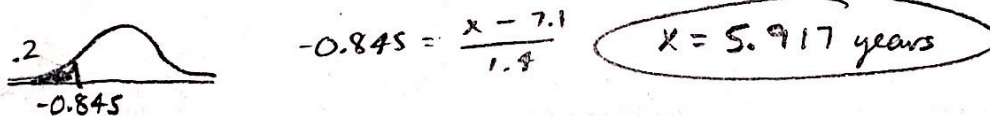
(b) How long can someone expect CD players in the worst 5% of the population to last?



(c) If a randomly selected sample of 100 CD players is selected, what is the probability that their mean replacement time is between 6.5 and 7.5 years?

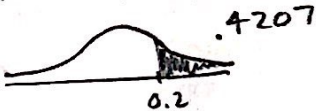


(d) Find the replacement time which separates the bottom 20% of CD players from the top 80%.



3. Assume z is a standard normal random variable.

(a) What is P(z > 0.2)?



(b) What is the P(z < 1.1)?



(c) If P(z < a) = 0.46, find a.



(d) If P(z < a) = 0.72, find a.

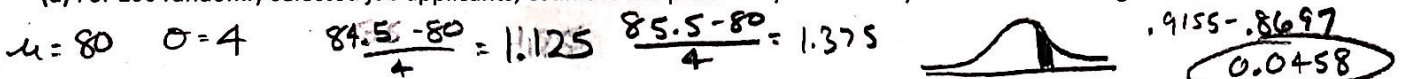


(e) If P(z > a) = 0.58, find a.

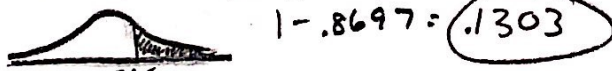


4. There is an 80% chance that a prospective employer will check the educational background of a job applicant.

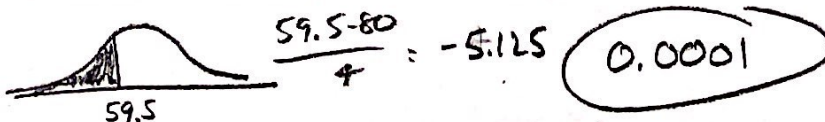
(a) For 100 randomly selected job applicants, estimate the probability that exactly 85 have their background checked.



(b) For 100 randomly selected job applicants, estimate the probability that at least 85 have their background checked.

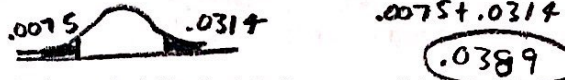


(c) For 100 randomly selected job applicants, estimate the probability that fewer than 60 have their background checked.

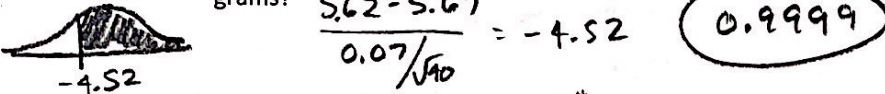


5. Quarters have weights that are normally distributed with a mean of 5.67 grams and a standard deviation of 0.07 grams.

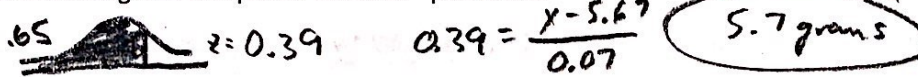
(a) If a vending machine is adjusted to reject quarters weighing less than 5.5 grams or more than 5.8 grams (due to the chance they may be counterfeit), what percentage of real quarters will also be rejected?

$$\frac{5.5 - 5.67}{0.07} = -2.43 \quad \frac{5.8 - 5.67}{0.07} = 1.86$$


(b) If a randomly selected sample of 40 quarters is chosen, what is the probability that their mean weight is greater than 5.62 grams?

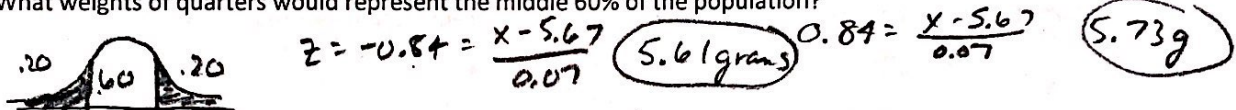
$$\frac{5.62 - 5.67}{0.07/\sqrt{40}} = -4.52$$


(c) Find the weight of the quarter at the 65th percentile.

$$z = 0.39 = \frac{x - 5.67}{0.07} \Rightarrow x = 5.7 \text{ grams}$$


(d) What weights of quarters would represent the middle 60% of the population?

$$z = -0.84 = \frac{x - 5.67}{0.07} \Rightarrow x = 5.61 \text{ grams}$$

$$z = 0.84 = \frac{x - 5.67}{0.07} \Rightarrow x = 5.73 \text{ grams}$$


6. In a binomial experiment, if $n=20$ and $p=0.2$, can a normal distribution be used to approximate $P(\text{more than } 3)$? Why or why not?

NO Because
 $np = 4$
 $nq = 16$
 $np < 5$

8. Are each of the following statements true or false?

- | | | |
|---|------|-------|
| (a) The mean of the sample means is the same as the population mean. | TRUE | FALSE |
| (b) The mean of the sample standard deviations is the same as the population mean. | TRUE | FALSE |
| (c) The mean of the sample variances is the same as the population variance. | TRUE | FALSE |
| (d) The mean of the sample medians is the same as the population median. | TRUE | FALSE |
| (e) The mean of the sample proportions is the same as the population proportion. | TRUE | FALSE |
| (f) The mean of the sample ranges is the same as the population range. | TRUE | FALSE |
| (g) The mean of the sample standard deviation is the same as the population standard deviation. | TRUE | FALSE |

Which of these sampling distribution statistics are unbiased estimators?

mean, variance, proportion