

Final answers should have accuracy to 6 decimal places (or 4 decimal places for table-derived answers). Show some work how the mean and standard deviation are computed. Giving only the answer will bring you few points.

1. (18pts) A restaurant chain is reviewing scores on the question "quality of food" on a comment card. The scores were numbers 1-5 (5 being best), and the number of cards with a given score on the question is listed below.

- a) Find the range of the scores.
 b) Find the mean of the scores.
 c) Find the standard deviation of the scores.

Score	Frequency (cards)
1	2
2	7
3	13
4	12
5	8
	42

a) $range = 5 - 1 = 4$

b) $\bar{x} = \frac{1 \cdot 2 + 2 \cdot 7 + 3 \cdot 13 + 4 \cdot 12 + 5 \cdot 8}{42}$
 $= \frac{143}{42} = \boxed{3.404762}$

$2(1-3.404762)^2 + 7(2-3.404762)^2 + 13(3-3.404762)^2 + 12(4-3.404762)^2 + 8(5-3.404762)^2$
 $= 52.11...$

$s = \sqrt{\frac{52.11}{41}} = \sqrt{1.271} = \boxed{1.127473}$

2. (10pts) The wait time at a grocery store checkout between the hours 4PM and 6PM on a Saturday has been found to have mean 4 minutes, with standard deviation 1.25 minutes. Use the 68-95-99.7 rule (draw a picture) to find the percentage of patrons that waited:

- a) between 4 and 6.5 minutes

$\frac{0.95}{2} = 0.475$ 47.5%

- b) under 2.75 minutes

$0.5 - \frac{0.68}{2} = 0.5 - 0.34 = 0.16$ 16%

- c) over 6.5 minutes

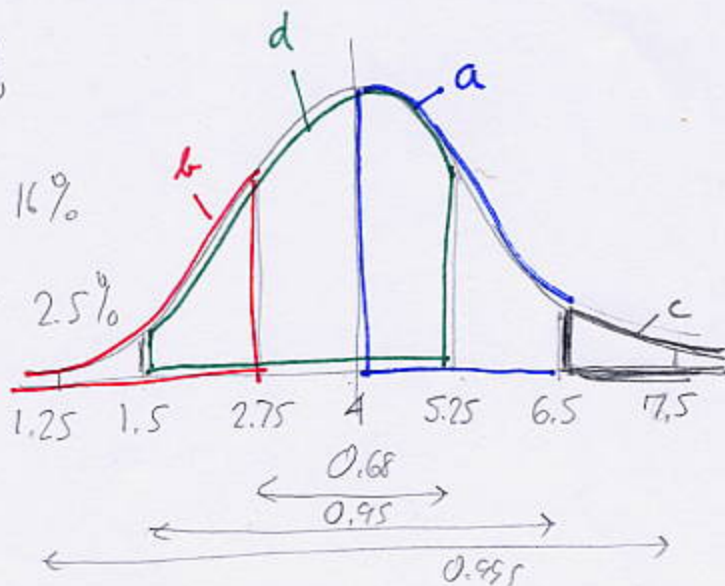
$0.5 - \frac{0.95}{2} = 0.5 - 0.475 = 0.025$ 2.5%

- d) between 1.5 and 5.25 minutes.

$\frac{0.95}{2} + \frac{0.68}{2} = 0.475 + 0.34$

$= 0.815$

81.5%



3. (6pts) A set of data items is normally distributed with mean 13 and standard deviation 2.3. Find the data items that correspond to the z-scores given below.

a) $z = 0$

$$x = 13$$

b) $z = 0.6$

$$x = 13 + 0.6 \cdot 2.3 = 14.38$$

c) $z = -1.7$

$$x = 13 - 1.7 \cdot 2.3 = 9.09$$

4. (4pts) Car companies were rated for owner satisfaction by many surveys. Company A scored 22 points on a survey with mean 18 and standard deviation 3, and company B scored 64 points on a survey with mean 50 and standard deviation 9. Use z-scores to determine which company did better.

$$z_A = \frac{22 - 18}{3} = \frac{4}{3} = 1.3\bar{3}$$

$$z_B = \frac{64 - 50}{9} = \frac{14}{9} = 1.5\bar{5} \quad \text{Company B did better.}$$

5. (22pts) The weight of cows at a certain farm is normally distributed with mean 825 lbs and standard deviation 56lbs. Draw a picture showing which area you are computing as you answer:

- What percentage of cows weigh less than 900 lbs?
- What percentage of cows weigh more than 800 lbs?
- What is the percentile of a cow weighing 875 lbs? What does this mean?
- What is the probability that a random cow weighs between 700 and 750 lbs?

