Name: * ANSWER KEY * 11/8/2019

Math 1100.L02 - Finite Mathematics **Quiz 3**

Please put away all papers and electronic devices except a calculator. Show enough work that it is clear how you arrived at your answer. Round decimal answers to four decimal places. Box/circle your final answers. Good luck!

1. (4 points) Fill in the correct frequencies in the frequency tabel below based on the following data.

31	32	5	3	2	9	10	15	43	12
7	28	39	11	46	18	20	37	49	0

Interval	Frequency
0-9	6
10-19	5
20-29	2
30-39	4
40-49	3

2. Consider the following set of data.

29 27 14 23 27

(a) (4 points) Compute the mean $\overline{x}$, and show how you arrived at your answer.

$$\bar{x} = \frac{\Sigma x}{n} = \frac{29+27+14+23+27}{5}$$

$$= \frac{120}{5} = \boxed{24}$$

(b) (4 points) Compute the median.

1. PUT IN ORDER 14 23 $\boxed{27}$ 27 29

2. MIDDLE VALUE

(c) (4 points) Compute the mode.

$\boxed{27}$

(d) (4 points) Compute the range.

HIGHEST - LOWEST = 29 - 14 = $\boxed{15}$

TWO DIFFERENT WAYS

(e) (4 points) Compute the variance s^2, and show how you arrived at your answer.

x	$x-\bar{x}$	$(x-\bar{x})^2$
29	5	25
27	3	9
14	-10	100
23	-1	1
27	3	+ 9
		144

$$s^2 = \frac{\sum (x-\bar{x})^2}{n-1} = \frac{144}{4} = \boxed{36}$$

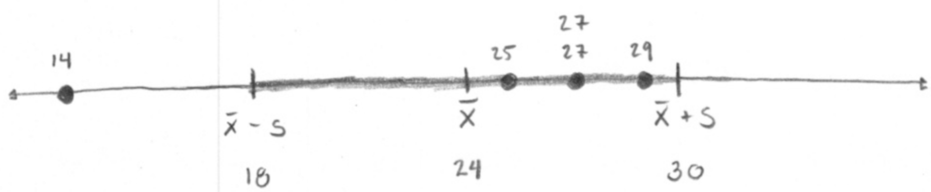
x	x^2
29	841
27	729
14	196
23	529
27	729 +
	3024

$$s^2 = \frac{\sum x^2 - n\bar{x}^2}{n-1} = \frac{3024 - 5(576)}{4} = 36$$

(f) (4 points) Compute the standard deviation s, and show how you arrived at your answer.

$$s = \sqrt{s^2} = \sqrt{36} = \boxed{6}$$

(g) (4 points) What percentage of the data values lie within 1 standard deviation of the mean?

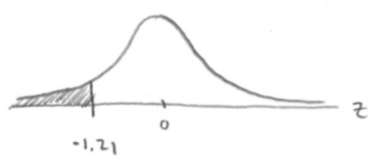


4 out of 5 DATA VALUES LIE WITHIN 1 s OF $\bar{x}$, i.e BETWEEN 18 & 30.

$\therefore \ \frac{4}{5} = \boxed{80\%}$

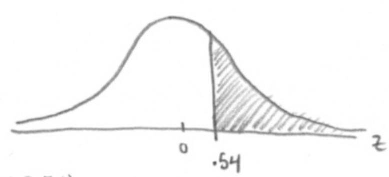
3. Let z be a random variable with the standard normal probability distribution ($\mu = 0$, $\sigma = 1$). Using the table provided at the end of the exam or a calculator, determine the following probabilities.

(a) (8 points) $P(z \leq -1.21)$



$\boxed{.1131}$

(b) (8 points) $P(z \geq 0.54)$

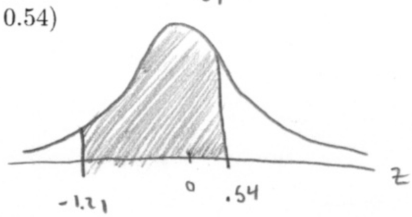


$P(z \geq .54) = 1 - P(z \leq .54)$

$= 1 - .7054$

$= \boxed{.2946}$

(c) (8 points) $P(-1.21 \leq z \leq 0.54)$



$P(-1.21 \leq z \leq .54)$

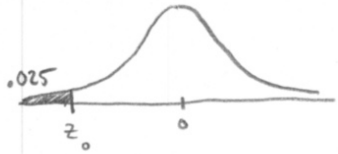
$= P(z \leq .54) - P(z \leq -1.21)$

$= .7054 - .1131$

$= \boxed{.5923}$

4. Let z be a random variable with the standard normal probability distribution ($\mu = 0$, $\sigma = 1$). Use the table provided at the end of the exam or a calculator to answer the following questions.

(a) (8 points) Determine the value z_0 such that $P(z \leq z_0) = .025$.



	.06
-1.9	.0250

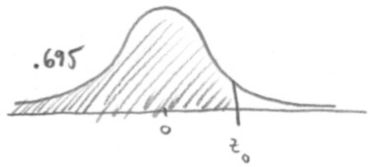
$z_0 = \boxed{-1.96}$

(b) (8 points) Determine the value z_0 such that $P(z \geq z_0) = .305$.

$P(z \leq z_0) = 1 - P(z \geq z_0)$

$= 1 - .305$

$= .695$



	.01
0.5	.6950

$z_0 = \boxed{.51}$

5. Suppose that you must establish regulations concerning the maximum number of people who can occupy an elevator. A study indicates that if eight people occupy the elevator, the probability distribution of the total weight x of the eight people is normally distributed with a mean $\mu = 1200$ pounds and a standard deviation $\sigma = 99$ pounds.

(a) (8 points) What is the probability that the total weight x of eight people exceeds 1425 pounds?

* STANDARDIZE: $z = \dfrac{x - \mu}{\sigma}$

$P(x \geq 1425) \overset{*}{=} P\left(z \geq \dfrac{1425 - 1200}{99}\right) = P(z \geq 2.27)$

$= 1 - P(z \leq 2.27)$

$= 1 - .9884$ (CALCULATOR ANSWER: .0115)

$= \boxed{.0116}$

(b) (8 points) Determine the value x_0 such that the probabilty that the total weight x of the eight people exceeds x_0 is .001.

FIRST FIND z_0 SUCH THAT $P(z \geq z_0) = .001 \longrightarrow P(z \leq z_0) = 1 - .001 = .999$

	.00
3.1	.9990

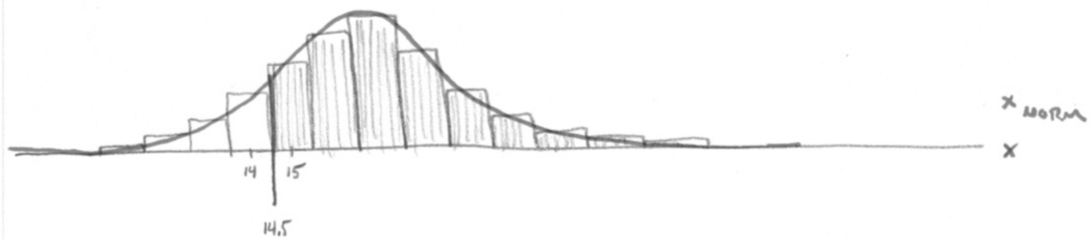
$z_0 = 3.10$ OR 3.09 OR 3.08

THEN $z_0 = \dfrac{x_0 - \mu}{\sigma} \Rightarrow 3.1 = \dfrac{x_0 - 1200}{99}$

$x_0 = 1200 + (3.1)(99) = \boxed{1506.9}$ OR 1505.91 OR 1504.92

(CALCULATOR ANSWER: 1505.933)

6. (12 points) Airlines and hotels often grant reservations in excess of capacity to minimize losses due to no-shows. Suppose the records of a hotel show that, on the average, $p = 10\%$ of their prospective guests will not claim their reservation (no-shows). If the hotel accepts $n = 215$ reservations and there are only 200 rooms in the hotel, what is the probability that all guests who arrive to claim a room will receive one? In other words, what is the probability that the number of no-shows x is at least 15? Use a normal approximation to the binomial distribution for x to answer this question.



$\mu = np = (215)(.1) = 21.5$

$\sigma = \sqrt{npq} = \sqrt{(215)(.1)(.9)} = 4.3989$

$P(x \geq 15) \approx P(x_{NORM} \geq 14.5)$

$\downarrow$ STANDARDIZE

$= P\left(z \geq \dfrac{14.5 - 21.5}{4.3989}\right) = P(z \geq -1.59)$

$= 1 - P(z \leq -1.59)$

$= 1 - .0559$

$= \boxed{.9441}$

(CALCULATOR ANSWER : .9442)