

STAT 211 SECTION 001 TEST #1

Name (**Print Neatly**): _____ ID: _____

USE THE ROUGH WORK PAGES AND THIS BOOKLET TO SHOW YOUR WORK

1. This is an 80 minute closed book test.
2. You are allowed to use a NON-PROGRAMMABLE calculator.
3. All electronic devices should be turned off and put away. Please do this now.
4. Make sure you record your multiple choice answers in the appropriate space provided.
5. Please be sure to show all necessary calculations / essential steps for written questions in the space provided.
6. You may use the rough work pages for rough work. These will not be marked. Please be sure and keep all pages of this exam booklet together and stapled.

MARKS

Q1 - Q8	Q9	Q10	TOTAL
/8	/7	/5	/20

*****PLEASE RECORD YOUR MULTIPLE CHOICE ANSWERS HERE**

QUESTION	ANSWER
1.	B
2.	A
3.	A
4.	B
5.	B
6.	B
7.	B
8.	A

PART I—MULTIPLE CHOICE [1 MARK EACH; NO PART MARKS]

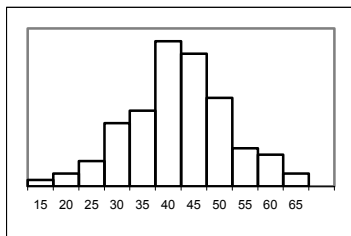
1. An IQ score is an example of a(n) _____ variable.

- A) ordinal
- B) interval
- C) ratio
- D) nominative

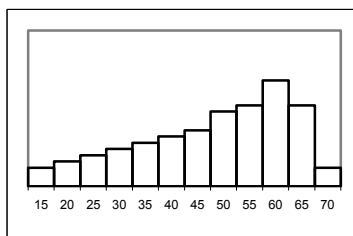
2. A student has applied for a job at two local businesses. They estimate that there is a 60% chance they'll be employed by Willie's Wings and only a 30% chance that they'll be employed by Paul's Pizzeria and Pub. The student also believes that there is a 30% chance that neither place will employ them. Based on this information, what can we say about these events?

- A) They are not mutually exclusive but are dependent.
- B) They are mutually exclusive and dependent.
- C) They are mutually exclusive and independent.
- D) They are not mutually exclusive but are independent.
- E) Not enough information.

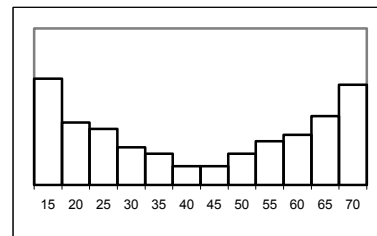
3. The following histograms (a, b and c) show three distributions.



(a)



(b)



(c)

The computer output given below shows the mean, median, and standard deviation of the three distributions, plus the mean, median, and standard deviation for a 4th distribution (that is not shown).

1. Count 100
 Mean 42.65
 Median 42.50
 Std Dev 20.9434

2. Count 100
 Mean 47.90
 Median 50.00
 Std Dev 14.6023

3. Count 100
 Mean 52.10
 Median 50.00
 Std Dev 14.5475

4. Count 100
 Mean 42.40
 Median 42.50
 Std Dev 10.8361

Which of the following is the correct matching of histogram to summary statistics?

- A) a = 4, b = 2, c = 1
- B) a = 1, b = 2, c = 4
- C) a = 4, b = 3, c = 1
- D) a = 1, b = 3, c = 4

4. When five economists played poker together last Saturday night, there were four losers and one big winner--the econometrician. Which of the following can we deduce, without knowing the details? **Note:** You can regard a loss as a negative win.

- A) the average win was negative
C) the median win was positive
B) the median win was negative
D) the median win was zero

5. According to Chebyshev's theorem, at least 75% of the population values lie in the interval $[2, 10]$. What is the population variance?

- A) 2.0
B) 4.0
C) 6.0
D) 8.0
E) 10.0

6. If A and B be events in a sample space, S, then $P(A \cap \bar{B})$ is **always** equal to:

- A) $P(A \cup B)$
B) $P(A) + P(\bar{B}) - P(A \cup \bar{B})$
C) $1 - P(\bar{A} \cap B)$
D) $P(A) * P(\bar{B})$

7. If A and B are events such that $P(A) = 0.30$, $P(B) = 0.45$. Assuming that A and B are independent, what is the probability that none of these two events will occur?

- A) 0.615
B) 0.385
C) 0.865
D) cannot be determined

8. Suppose we have a box that contains three fair coins and one coin with a head on each side. A coin is selected at random. If we flip the coin twice, what is the chance that the coin is fair given that we have seen two heads in a row?

- A) 0.43
B) 0.60
C) 0.40
D) 0.65

PART II—WRITTEN QUESTIONS (Show all calculations / formulas used / essential steps in order to receive part or full marks)

Use the following to answer all parts of the next question:

9. A stemplot of ages of 29 faculty members in a college math department is given as follows:

```
2|6
3|001112245
4|243578
5|0012344
6|0125
7|
8|01
```

a) What is the IQR of the distribution? [3 marks]

$$\text{IQR} = Q_3 - Q_1 \text{ [1 mark]}$$

$$Q_3: I = 29 \cdot 75 / 100 = 21.75 \Rightarrow 22^{\text{nd}} \text{ ordered observation. So, } Q_3 = 54 \text{ [0.5 mark]}$$

$$Q_1: I = 29 \cdot 25 / 100 = 7.25 \Rightarrow 8^{\text{th}} \text{ ordered observation. So, } Q_1 = 32 \text{ [0.5 mark]}$$

$$\text{IQR} = 54 - 32 = 22 \text{ [1 mark]}$$

- If a calculation error was made along the way, only penalize once. If everything else is correct mechanically, give full marks after mistake.

b) How many outliers are there in the data set? [3 marks]

To check for outliers, we need to determine the upper limit and lower limit.

$$\text{UL} = Q_3 + 1.5\text{IQR} = 54 + 1.5(22) = 87 \text{ [1 mark]}$$

$$\text{LL} = Q_1 - 1.5\text{IQR} = 32 - 1.5(22) = -1 \text{ [1 mark]}$$

Therefore, any observations less than -1 or greater than 87 would qualify as outliers.

There are no outliers in the set. [1 mark]

c) If the oldest faculty member retires and is replaced by a 26-year old, what happens to the median age? [1 mark]

The median would be reduced by 2 years, from 47 to 45. [1 mark]

Use the following to answer all parts of the next question:

10. At a local University, 100 second year students were surveyed about the type of music they listen to. Here are the results:

- 50 listen to classic rock
- 40 listen to pop music
- 30 listen to hip hop
- 20 listen to both classic rock and pop music
- 10 listen to both pop music and hip hop
- 10 listen to classic rock and hip hop
- 5 listen to all three types

Note: A Venn Diagram would be very useful here.

a) What is the probability that a randomly selected student would listen to at least one of these types of music? **[3 marks]**

Using a formula here, we want $P(C \cup P \cup H) = P(C) + P(P) + P(H) - P(C \cap P) - P(C \cap H) - P(P \cap H) + P(C \cap P \cap H) = 0.5 + 0.4 + 0.3 - 0.2 - 0.1 - 0.1 + 0.05 = 0.85$

- Here I've let C = listens to classic rock, P = listens to pop music, and H = listens to hip hop
- I've used a formula here. If a diagram was used, then you can still give full marks, as that's what I suggested.
- 1 mark for defining events in any way (doesn't matter what letters are used).
- 1 mark for recognizing that $P(\text{listen to at least one type of music}) = P(C \cup P \cup H)$.
- 1 mark for calculation

b) What is the probability that a randomly selected student would listen to none of these types of music? **[1 mark]**

$P(\text{listen to none}) = 1 - P(\text{at least one}) = 1 - P(C \cup P \cup H)$ **[0.5 mark]**
 $= 1 - 0.85 = 0.15$ **[0.5 mark]**

c) What is the probability that a randomly selected student would listen to classic rock only? **[1 mark]**

Using a formula, $P(\text{classic rock only}) = P(C \cap \bar{P} \cap \bar{H}) = P(C) - P(C \cap P \cap \bar{H}) - P(C \cap \bar{P} \cap H) - P(C \cap P \cap H) = 0.5 - 0.15 - 0.05 - 0.05 = 0.25$

- 1 mark for correct calculation (0.5 if they've made a minor mistake, but still knew what they were doing)

