KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
MATHEMATICS DEPARTMENT

STAT 319 PROBABILITY & STATISTICS FOR ENGINEERS & SCIENTISTS
Semester 213, First Exam
June 21st, 2022
Time allowed 90 minutes

Name: _____ ID #:_____

Section #: _____ Serial #:_____

Important Instructions:

Check that this exam has 18 questions

- All types of pagers or mobile phones are NOT allowed during the examination.
- Use HB 2.5 pencils only.
- Use a good eraser. DO NOT use the erasers attached to the pencil.
- Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.
- When bubbling your ID number and Section number, be sure that the bubbles match with the numbers that you write.
- The Test Code Number is already bubbled in your answer sheet. Make sure that it is the same as that printed on your question paper.
- When bubbling, make sure that the bubbled space is fully covered.
- When erasing a bubble, make sure that you do not leave any trace of penciling
- Formula sheet will be provided to you in exam. You are not allowed to bring, with you, formula sheet or any other printed/written paper.

1. The nine measurements that follow are furnace temperatures recorded on successive batches in a semiconducting process (units are ^0F),

935	940	942	950	953	954	955	960	970

Given that the $\bar{x} = 951$, $\tilde{x} = 953$ and $s = 10.78$, what is the z – score of the median of the temperatures?

a. 0.1855
b. $- 0.1855$
c. $- 0.5566$
d. 0.5566
e. 0

2. The accompanying frequency distribution of the fracture strength observations for ceramic bars fired in a particular oven

Class	[83-85)	[85-87)	[87-89)	[89-91)	[91-93)	[93-95)	[95-97)
Frequency	7	17	30	43	28	22	13

The approximate average of fracture strength equals

a. 90.325
b. 2064.571
c. 90
d. 14452
e. 160

3. The following sample data apply to the average yield of a final product (in grams) from each liter of chemical feedstock

23	24	25	25	26	27	27	28	28	29
29	29	29	30	31	31	31	32	33	34

Given that $\sum x_i = 571$ and $\sum x_i^2 = 16473$, Based on this information, the percentage of the data that are within one standard deviation of the mean

a. 65%
b. 68%
c. 60%
d. 55%
e. 62%

4. A Company has two assembly lines in its plant. Line A produces an average of 335 units per day with a standard deviation equal to 11 units. Line B produces an average of 145 units per day with a standard deviation equal to 8 units. Based on this information, which of the following statements is true?

   a. Line A has smaller relative variation than line B.
   b. Line B has smaller relative variation than line A.
   c. Both lines exhibit the same relative variation.
   d. Sometime line A has smaller relative variation and sometime line B has smaller relative variation.
   e. Unable to tell with the given information

5. Which of the following is false

   a. For left skewed unimodal data, the mean is greater than the median
   b. Outliers affect the range
   c. A sample of grades of a class with too many poor students compared to good students will be right skewed
   d. The mean is the only measure with the property that the sum of deviations of the data about the mean is zero
   e. The variance is a measure of variation

6. Given below is the stem-and-leaf display representing the amount of detergent used in gallons (with leaves in tenths of gallons, i.e. the **minimum is 9.1 gallons**) in a day by 25 drive-through car wash operations in Phoenix.

```
 9  | 1 4 7
10  | 0 2 2 3 8
11  | 1 3 5 5 6 6 7 7 7
12  | 2 2 3 4 8 9
13  | 0 2
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   The IQR is equal to

   a. 2
   b. 1.95
   c. 1.9
   d. 0.6
   e. 1.35

7. A system consists of two components. The probability that the second component functions in a satisfactory manner is 0.9, the probability that at least one of the two components does so is 0.96, and the probability that both components do so is 0.75. Given that the first component functions in a satisfactory manner, what is the probability that the second one does also?

   a. 0.93
   b. 0.81
   c. 0.07
   d. 0.19
   e. We need more information to tell

8. A petroleum engineer has collected 12 specimens of soil from location A, and 13 specimens from location B. He instructs a laboratory assistant to randomly select 2 of the specimens for analysis. The probability that the second specimen in the sample is from Location A

   a. 0.48
   b. 0.22
   c. 0.26
   d. 0.25
   e. 0.46

9. It is known that a patient with a disease will respond to treatment with probability equal to 0.9. If ten patients with the disease are treated and respond independently, the probability that exactly the last two patients will not respond is

   a. 0.0043
   b. 0
   c. 0.1937
   d. 1
   e. 0.5

10. A smoke detector system uses two devices, A and B. If smoke is present, the probability that it will be detected by device A is 0.95; by device B 0.90; and by both devices, 0.88. If smoke is present, find the probability that it will be undetected

    a. 0.03
    b. 0.97
    c. 0.05
    d. 0.1
    e. 0.005

11. Suppose that the probability that Ahmad and Ali will succeed in assembling the computer are 56% and 71% respectively and that the probability that both will succeed is 39%. Then compute the probability that Ali will succeed in assembling the computer and Ahmad will not succeeded in assembling the computer.

    a. 0.32
    b. 0.17
    c. 0.88
    d. 0.31
    e. 0.16

12. Three road construction firms, X, Y and Z, bid for a certain contract. From past experience, it is estimated that the probability that X will be awarded the contract is 0.40, while for Y and Z the probabilities are 0.35 and 0.25. If X does receive the contract, the probability that the work will be satisfactorily completed on time is 0.75. For Y and Z these probabilities are 0.80 and 0.70. It turns out that the work was done satisfactorily, what is the probability that Y was awarded the contract?

    a. 0.371
    b. 0.280
    c. 0.755
    d. 0.397
    e. 0.232

13. Suppose that 7 users are authorized to use a particular computer system, and that the system collapses if more than 4 users attempt to log on simultaneously. Suppose that each user has the same probability 0.2 of wishing to log on in each hour. What is the probability that the system will crash in a given hour?

    a. 0.0047
    b. 0.0333
    c. 0.0043
    d. 0.0287
    e. 0.0004

14. Assume that each of your calls to a popular radio station has a probability of 0.05 of connecting, that is, of not obtaining a busy signal. Assume that your calls are independent. What is the probability that your first call that connects is your sixth call?

    a. 0.0387
    b. 0.0368
    c. 0.0407
    d. 0.05
    e. 0.95

15. A construction firm bids on contract. It anticipates profit of $70,000 if it gets the contract for the full project, and it estimates profit of $10,000 on shared project: The company estimates there's 20% chance it will get the full project contract and a 75% chance it will get the shared project contract; otherwise, it gets nothing. What is the expected profit earned on these contracts?

    a. $21500
    b. $14000
    c. $25000
    d. $52500
    e. $54500

16. Batch contains 50 bacteria cells and 10 of the cells are not capable of cellular replication. Suppose that you examine 6 bacteria cells selected at random without replacement. What is the probability that at least one of the selected cells cannot replicate?

   a. 0.7586
   b. 0.2414
   c. 0.0959
   d. 0.0020
   e. 0.9040

17. On average there are about 25 imperfections in 100 meters of optical cable. What is the probability that there is no more than one imperfection in 1 meter of cable?

   a. 0.974
   b. 0.778
   c. 0.026
   d. 0
   e. 0.195

18. Computer chips often contain surface imperfections. For a certain type of computer chip, the probability mass function of the number of defects X is presented in the following table.

X	0	1	2	3	4	5
f(x)	A	0.41	0.19	0.15	0.1	B

If the expected number of defective ships is 1.89, then $P(X \geq 2 \mid X < 4) =$

   a. 0.40
   b. 0.34
   c. 0.85
   d. 0.49
   e. 0.15