18 (A)(B)(C)(D) 38 (A)(B)(C)(D) 58 (A)(B)(C)(D)
19 (A)(B)(C)(D) 39 (A)(B)(C)(D) 59 (A)(B)(C)(D)
20 (A)(B)(C)(D) 40 (A)(B)(C)(D) 60 (A)(B)(C)(D)

Key
(A)(B)(C)(D)

Student's name: Please go on to the next page...

Q.1 (20 points): Multiple-Choice Problems.

If $P(A) = 0.4, P(B) = 0.3$ and $P(A \cap B) = 0.2$. **Use this information to answer questions 1-7.**

1. $P(A') =$ $1 - P(A) = 1 - 0.4 = 0.6$
   A. 0.4 B. 0.6 C. 0.7 D. 0.8
2. $P(A \cup B) =$ $P(A) + P(B) - P(A \cap B) = 0.4 + 0.3 - 0.2 = 0.5$
   A. 0.5 B. 0.4 C. 0.2 D. 0.1
3. $P(A' \cap B) =$ $P(B) - P(A \cap B) = 0.3 - 0.2 = 0.1$
   A. 0.5 B. 0.4 C. 0.2 D. 0.1
4. $P[(A \cap B)'] =$ $(A' \cap B') = 1 - P(A \cup B) = 1 - 0.5 = 0.5$
   A. 0.8 B. 0 C. 0.5 D. 0.4
5. $P[(A \cup B)' \cap A] =$
   A. ϕ B. 1 C. 0 D. 0.2
6. $P(A' \cup B) =$ $1 + P(A \cap B) - P(A) = 1 + 0.2 - 0.4 = 0.8$
   A. 0.6 B. 0.1 C. 0.2 D. 0.8
7. $P(A \mid B) =$ $= \frac{P(A \cap B)}{P(B)} = \frac{0.2}{0.3} = 0.66$
   A. 0.66 B. 0.3 C. 0.2 D. 0.33
8. Two events, denoted as E_1 and E_2, are said to be mutually exclusive if
   A. $P(E_1 \cap E_2) = P(E_1)P(E_2)$ B. $E_1 \cap E_2 = \phi$ C. $P(E_1 \mid E_2) = P(E_1)$ D. Independent.
9. It is a subset of the sample space of a random experiment.
   A. Random Experiments B. Event C. Sample Spaces D. Bayes' Theorem

Disks of polycarbonate plastic from a supplier are analyzed for scratch and shock resistance. The results from 100 disks are summarized as follows.

		shock resistance: high	shock resistance: low
scratch resistance	high	70	9
	low	16	5

$70 + 9 = 79$, $16 + 5 = 21$, $79 + 21 = 86$

Let A denote the event that a disk has high shock resistance, and let B denote the event that a disk has high scratch resistance. **Use this information to answer questions 10-14.**

10. $P(A) =$ $\frac{86}{100} = 0.86$
    A. 0.79 B. 0.14 C. 0.86 D. 0.21
11. $P(B) =$ $\frac{79}{100} = 0.79$
    A. 0.79 B. 0.14 C. 0.86 D. 0.21

12. $P(A \mid B) =$
    A. 0.16 B. 0.89 C. 0.18 D. 0.14
13. $P(A' \mid B) =$
    A. 0.11 B. 0.81 C. 0.18 D. 0.14
14. $P(A \cap B') =$
    A. 0.16 B. 0.81 C. 0.18 D. 0.14

If $P(B') = 0.7$, and $P(A' \cap B) = 0.2$. **Use this information to answer questions 15-17.**

9. It is a subset of the sample space of a random experiment.
A. Random Experiments B. Event C. Sample Spaces D. Bayes' Theorem

Disks of polycarbonate plastic from a supplier are analyzed for scratch and shock resistance. The results from 100 disks are summarized as follows.

		shock resistance	
		high	low
scratch	high	70	9
resistance	low	16	5

Let A denote the event that a disk has high shock resistance, and let B denote the event that a disk has high scratch resistance. **Use this information to answer questions 10-14.**

10. $P(A) =$
A. 0.79 B. 0.14 C. 0.86 D. 0.21

$P(A \cap B) = \frac{70}{100} = 0.70$

11. $P(B) =$
A. 0.79 B. 0.14 C. 0.86 D. 0.21

12. $P(A \mid B) =$
A. 0.16 B. 0.89 C. 0.18 D. 0.14

$\frac{P(A \cap B)}{P(B)} = \frac{0.70}{0.79} =$

13. $P(A' \mid B) =$
A. 0.11 B. 0.81 C. 0.18 D. 0.14

$\frac{P(A' \cap B)}{P(B)} \rightarrow P(A' \cap B) = P(B) - P(A \cap B) =$
$0.79 - 0.70 = 0.09$

14. $P(A \cap B') =$
A. 0.16 B. 0.81 C. 0.18 D. 0.14

$P(A) - P(A \cap B) =$
$0.86 - 0.70 = 0.16$

If $P(B') = 0.7$, and $P(A' \cap B) = 0.2$. **Use this information to answer questions 15-17.**

15. $P(A \cap B) =$
A. 0.5 B. 0.2 C. 0.1 D. 0.33

$P(B) - P(A' \cap B) = 0.3 - 0.2 = 0.1$

16. $P(A \mid B) =$
A. 0.5 B. 0.2 C. 0.1 D. 0.33

$\frac{P(A \cap B)}{P(B)} = \frac{0.1}{0.3} = 0.33$

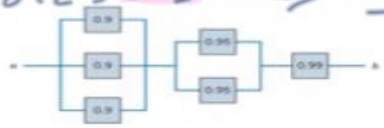
$P(B) = 1 - P(B') = 1 - 0.7 = 0.3$

17. $P(B \mid A)P(A) =$
A. 0.5 B. 0.2 C. 0.1 D. 0.33

$P(A) = P(A \cap B) + P(A \cap B')$
$0.1 + 0.2 = 0.3$

$\frac{P(A \cap B)P(A)}{P(A)} = \frac{0.1 \times 0.3}{0.3} = 0.1$

The following circuit operates only if there is a path of functional devices from left to right. The probability that each device functions is shown on the graph. Assume that devices fail independently.



Use this information to answer question 18.

18. The probability that the circuit operates is:
A. 0.9975 B. 0.10 C. 0.987 D. 0.059

The following function is probability mass functions.

x	-2	-1	0	1	2
$f(x)$	2/8	1/8	3/8	1/8	1/8

Use this information to answer questions 19-20.

19. $P(X \leq 0) =$
A. 0 B. $\frac{3}{8}$ C. $\frac{6}{8}$ D. $\frac{4}{8}$

$\frac{3}{8} + \frac{1}{8} + \frac{2}{8} = \frac{6}{8}$

20. $P(-1 \leq X < 1) =$
A. 0 B. $\frac{3}{8}$ C. $\frac{6}{8}$ D. $\frac{4}{8}$

$\frac{3}{8} + \frac{1}{8} = \frac{4}{8}$