CUET Mathematics Test

Chapter: Probability Distributions - Random Variables

SOLUTIONS

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Solutions

1. **Solution:** Sum of probabilities $= 1$. $k + 2k + 3k = 1 \Rightarrow 6k = 1 \Rightarrow k = 1/6$. **Correct Option: (A)**.

2. **Solution:** $P(\text{Ace}) = 4/52 = 1/13$. $P(\text{Not Ace}) = 12/13$. $P(X = 1) = P(A, \bar{A}) + P(\bar{A}, A) = (1/13 \times 12/13) + (12/13 \times 1/13) = 24/169$. **Correct Option: (A)**.

3. **Solution:** $X \geq 10$ for pairs: $(4,6), (5,5), (6,4), (5,6), (6,5), (6,6)$. Total $= 6$. $P = 6/36 = 1/6$. **Correct Option: (B)**.

4. **Solution:** Sum $= 0.1 + k + 2k + k(5-3) + k(5-4) = 1 \Rightarrow 0.1 + 6k = 1 \Rightarrow 6k = 0.9 \Rightarrow k = 0.15$. **Correct Option: (B)**.

5. **Solution:** Sum $= 3k^3 - 10k^2 + 9k - 2 = 0$. Testing $k = 1/3$ gives $1/9 + (4/3 - 10/9) + (5/3 - 1) = 1/9 + 2/9 + 6/9 = 1$. **Correct Option: (A)**.

6. **Solution:** $^5C_2 = 10$. $X = 0$ means both green: $^2C_2 = 1$. $P = 1/10$. **Correct Option: (A)**.

7. **Solution:** $X^2 < 2 \Rightarrow X \in \{-1, 0, 1\}$. $P = 0.2 + 0.2 + 0.2 = 0.6$. **Correct Option: (C)**.

8. **Solution:** $P(T) = 1/4$. $P(X = 2) = P(T) \times P(T) = 1/16$. **Correct Option: (A)**.

9. **Solution:** Using $k = 1/3$ from Qu 5. $P(X < 1) = P(0) = 3(1/3)^3 = 3/27 = 1/9$. **Correct Option: (A)**.

10. **Solution:** $10x = 1 \Rightarrow x = 0.1$. Even values $\{0, 2\}$. $P = x + 3x = 4x = 0.4$. **Correct Option: (B)**.

11. **Solution:** $P(2) + P(3) = 0.2 + 0.3 = 0.5$. **Correct Option: (B)**.

12. **Solution:** $^4C_2(1/2)^4 = 6/16 = 3/8$. **Correct Option: (B)**.

13. **Solution:** $P(1) + P(2) = 1/15 + 2/15 = 3/15 = 1/5$. **Correct Option: (A)**.

14. **Solution:** $0.1 + k + 0.2 + 2k + 0.3 = 1 \Rightarrow 3k = 0.4 \Rightarrow k \approx 0.133$. **Correct Option: (B)**.

15. **Solution:** $1 - P(0) = 1 - (^{48}C_2 / ^{52}C_2) = 1 - 188/221 = 33/221$. **Correct Option: (A)**.

16. **Solution:** $a \sum r^n = a/(1 - r) = 1 \Rightarrow a = 1 - r$. **Correct Option: (B)**.

17. **Solution:** Half the values are $> n/2$. $P = 1/2$. **Correct Option: (A)**.

18. **Solution:** $1/4 + 1/16 + \cdots = \frac{1/4}{1 - 1/4} = 1/3$. **Correct Option: (B)**.

19. **Solution:** $(^2C_1 \times ^4C_2)/^6C_3 = (2 \times 6)/20 = 12/20 = 3/5$. **Correct Option: (B)**.

20. **Solution:** $13k^2 + 7k - 1 = 0$ gives $k = 1/9$ (approx valid). $P(X < 3) = 6k = 6/9$. **Correct Option: (D)**.