

REG-PROB-2425-ASM-SET 2-MATH

Suggested solutions

Multiple Choice Questions

- | | | | | |
|-------|-------|-------|-------|-------|
| 1. B | 2. C | 3. C | 4. C | 5. B |
| 6. A | 7. D | 8. B | 9. D | 10. B |
| 11. A | 12. B | 13. C | 14. C | 15. C |
| 16. D | 17. D | 18. B | 19. B | 20. A |
| 21. A | 22. C | 23. C | 24. A | 25. A |
| 26. B | 27. D | 28. C | 29. A | 30. C |
| 31. C | 32. D | 33. A | 34. A | 35. A |
| 36. D | 37. D | 38. C | 39. C | |

1. ☐ B

$$\begin{aligned}\text{Required probability} &= 1 - 0.2 - 0.25 \\ &= 0.55\end{aligned}$$

2. ☐ C

$$\begin{aligned}\text{Total number of students} &= 14 + 8 + 5 = 27 \text{ and number of boys} = 27 - 16 = 11 \\ \text{Required probability} &= \frac{11 + 6}{27} = \frac{17}{27}\end{aligned}$$

3. ☐ C

$$\begin{aligned}\text{Required probability} &= \frac{3}{10} + \frac{2}{10} - \frac{1}{10} \\ &= \frac{2}{5}\end{aligned}$$

4. ☐ C

It is possible that the sum of two numbers is 6 and the 2 numbers are both odd.

We have $P(A \cap B) > 0$.

$$\begin{aligned}P(A \cup B) &= P(A) + P(B) - P(A \cap B) \\ &< P(A) + P(B)\end{aligned}$$

5. ☐ B

$$\begin{aligned}\text{Required probability} &= \frac{3 + 6}{36} \\ &= \frac{1}{4}\end{aligned}$$

6. A

$$\begin{aligned}\text{Required probability} &= 1 - \frac{1}{4} - \frac{1}{5} - \frac{1}{6} \\ &= \frac{23}{60}\end{aligned}$$

7. D

$$\begin{aligned}\frac{p+3}{p+3+2} &= \frac{7}{9} \\ p &= 4 \\ \text{Required probability} &= \frac{4+2}{9} \\ &= \frac{2}{3}\end{aligned}$$

8. B

$$\begin{aligned}\text{Required probability} &= \frac{10}{20} + \frac{4}{20} - \frac{2}{20} \\ &= \frac{3}{5}\end{aligned}$$

9. D

$$\begin{aligned}\text{Required probability} &= \frac{5!2!}{6!} \\ &= \frac{1}{3}\end{aligned}$$

10. B

$$\begin{aligned}\text{Required probability} &= 1 - \frac{C_4^8 C_1^7 + C_5^8}{C_5^{15}} \\ &= \frac{9}{11}\end{aligned}$$

11. A

$$\begin{aligned}\text{Required probability} &= \frac{4!3!}{7!} \\ &= \frac{1}{35}\end{aligned}$$

12. B

$$\begin{aligned}\text{Required probability} &= \frac{2!7!4!}{11!} \\ &= \frac{1}{165}\end{aligned}$$

13. C

$$\text{Required probability} = 1 - \frac{C_6^{11}}{C_6^{19}} = \frac{635}{646}$$

14. C

$$\text{Required probability} = \frac{8!3!}{10!} = \frac{1}{15}$$

15. C

$$\begin{aligned}\text{Required number} &= \frac{3!(2!)^3}{6!} \\ &= \frac{1}{15}\end{aligned}$$

16. D

$$\begin{aligned}\text{Required probability} &= \frac{C_4^7 4!6!}{10!} \\ &= \frac{1}{6}\end{aligned}$$

17. D

$$\text{Required probability} = \frac{2!5!2!}{7!} = \frac{2}{21}$$

18. B

$$\text{Required probability} = 1 - \frac{C_2^5 + C_2^8}{C_2^{14}} = \frac{53}{91}$$

19. B

$$\begin{aligned}\text{Required probability} &= \frac{4!3!}{6!} \\ &= \frac{1}{5}\end{aligned}$$

20. A

$$\text{Required probability} = \frac{6!3!}{8!} = \frac{3}{28}$$

21. A

$$\begin{aligned}\text{Required probability} &= 1 - \frac{C_5^{12}}{C_5^{22}} \\ &= \frac{129}{133}\end{aligned}$$

22. C

$$\begin{aligned}\text{Required probability} &= \frac{C_3^8 C_2^4}{C_5^{12}} \\ &= \frac{14}{33}\end{aligned}$$

23. C

$$\begin{aligned}\text{Required probability} &= \frac{5!2!}{6!} \\ &= \frac{1}{3}\end{aligned}$$

24. A

$$\begin{aligned}\text{Required probability} &= \frac{7!3!}{9!} \\ &= \frac{1}{12}\end{aligned}$$

25. A

$$\begin{aligned}\text{Number of students taking both subjects} &= 16 + 21 - 30 = 7 \\ \text{Required probability} &= \frac{7}{30}\end{aligned}$$

26. B

$$\begin{aligned}\text{Required probability} &= 1 - \frac{1}{4} - \frac{1}{12} - \frac{1}{24} - \frac{1}{48} \\ &= \frac{29}{48}\end{aligned}$$

27. D

$$\begin{aligned}\text{Required probability} &= \frac{C_4^4 C_1^7 + C_3^4 C_2^7}{C_5^{11}} \\ &= \frac{13}{66}\end{aligned}$$

28. C

$$\begin{aligned}\text{Probability of Ivan and Jason sit next to each other in the 2nd row} &= \frac{2 \times 2! \times 7!}{9!} = \frac{1}{18} \\ \text{Required probability} &= \frac{\left(\frac{1}{18}\right)}{\left(\frac{3}{9}\right)} = \frac{1}{6}\end{aligned}$$

29. A

$$\begin{aligned}\text{Required probability} &= 1 - \frac{5 \times 4 \times 7 \times 6}{C_4^{22}} \\ &= \frac{185}{209}\end{aligned}$$

30. C

$$\begin{aligned}\text{Required probability} &= \frac{C_1^4 C_2^6}{C_3^{10}} \\ &= \frac{1}{2}\end{aligned}$$

31. C

$$\begin{aligned}\text{Required probability} &= \frac{4!4!}{8!} \\ &= \frac{1}{70}\end{aligned}$$

32. D

$$\begin{aligned}\text{Required probability} &= 1 - \frac{C_2^8}{C_2^{10}} \\ &= \frac{17}{45}\end{aligned}$$

33. A

$$\text{Required probability} = \frac{C_2^3 C_2^9 + C_3^3 C_1^9}{C_4^{12}} = \frac{13}{55}$$

34. A

$$\text{Required probability} = \frac{C_4^5 \times 4! \times 4!}{8!} = \frac{1}{14}$$

35. A

$$\text{Required probability} = \frac{C_3^{11} 3! 10!}{13!} = \frac{15}{26}$$

36. D

$$\begin{aligned}\text{Required probability} &= 1 - P(\text{same colour}) \\ &= 1 - \left(\frac{(2)(3) + (5)(4)}{(11)(10)} \right) = \frac{42}{55}\end{aligned}$$

37. D

Needs at least 3 draws $\Leftrightarrow$ no gold coins obtained in first 2 draws

$$\text{Required probability} = \frac{C_2^3}{C_2^7} = \frac{1}{7}$$

38. C

$$\begin{aligned}\text{Required probability} &= \frac{C_2^{12}}{C_2^{15}} \\ &= \frac{22}{35}\end{aligned}$$

39. C

$$\begin{aligned}\text{Required probability} &= 1 - 0.8^5 \\ &= 0.67232\end{aligned}$$

Conventional Questions

40. (a) Required probability = $\left(1 - \frac{1}{10}\right)\left(\frac{1}{2}\right)$ 1M
 $= \frac{9}{20}$ 1A
- (b) (i) Required probability = $\left(1 - \frac{2}{25}\right)\left(\frac{1}{2}\right)$ 1M
 $= \frac{23}{50}$ 1A
- (ii) (1) Required probability = $\left(\frac{2}{3}\right)\left(\frac{9}{20}\right) + \left(\frac{1}{3}\right)\left(\frac{23}{50}\right)$ 1M+1M
 $= \frac{34}{75}$ 1A
- (2) Required probability = $1 - \frac{34}{75}$ 1M+2M
 $= \frac{41}{75}$ 1A
41. (a) (i) $p = 1 - \frac{4}{5} = \frac{1}{5}$ 1A
- (ii) $q = 0$ and $r = 1$ 1A+1A
- (b) (i) Required probability = $\frac{1}{2} \times \frac{1}{2}$ 1M
 $= \frac{1}{4}$ 1A
- (ii) (I) Required probability = $\frac{1}{2} \times \frac{1}{3} + \frac{1}{2}$ 2M+1A
 $= \frac{2}{3}$ 1A
- (II) Required probability = $\frac{2}{3} \times \frac{4}{5}$ 1M+1A
 $= \frac{8}{15}$ 1A