

REG-PROB-2425-ASM-SET 3-MATH**Suggested solutions****Conventional Questions**

1. (a) Required probability = $\frac{C_2^3}{C_2^6}$ 1M
 $= \frac{1}{5}$ 1A
- (b) Expected gain = $10 \times \frac{1}{5} + 5 \times \frac{C_1^3 C_1^3}{C_2^6}$ 1M+1A
 $= \$5$ 1A

2. (a) Required probability = $\frac{3}{8}$ 1A
- (b) Required probability = $\frac{C_2^5}{C_2^8} \times \frac{3}{6}$ 1M
 $= \frac{5}{28}$ 1A
- (c) $P(A \text{ wins}) = \frac{3}{8} + \frac{5}{28} + \frac{C_4^5}{C_4^8} \times \frac{3}{4}$ 1M
 $= \frac{17}{28}$ 1A
 $> \frac{1}{2}$
Therefore, A is more likely to win the game. 1A

3. (a) Required probability = $\left(\frac{3}{4}\right)^2 + \left(\frac{1}{4}\right)^2$ 1M
 $= \frac{5}{8}$ 1A
- (b) (i) Required probability = $\left(1 - \frac{5}{8}\right)^3$ 1M
 $= \frac{27}{512}$ 1A
- (ii) Required probability = $\left(\frac{5}{8}\right)^3 + 3 \left(\frac{5}{8}\right) \left(1 - \frac{5}{8}\right)^2$ 1M
 $= \frac{65}{128}$ 1A

4. (a) $1 - (x)(0.9)(0.55) = 0.703$ 1M+1A
 $x = 0.6$ 1A
- (b) Required probability = $(0.6)(0.1)(0.45) + (0.4)(0.9)(0.45) + (0.4)(0.1)(0.55)$ 1M+1A
 $= 0.211$ 1A

5. (a) Required probability = $3(0.7)(1 - 0.7)^2$ 1M+1A
 $= 0.189$ 1A
- (b) Required probability = $3(0.7)^2(1 - 0.7)$ 1M+1A
 $= 0.441$ 1A
6. (a) Required probability = $\frac{28 \times 32}{60 \times 70}$ 1M
 $= \frac{16}{75}$ 1A
- (b) Required probability = $1 - \frac{14 \times 12}{60 \times 70}$ 1M+1A
 $= \frac{24}{25}$ 1A
- (c) Required probability = $\frac{14 \times (32 + 26) + (28 + 12) \times 12}{60 \times 70}$ 1M+1A
 $= \frac{341}{1050}$ 1A
7. (a) (i) Required probability = $\frac{C_2^8}{C_2^{20}}$ 1M
 $= \frac{14}{95}$ 1A
- (ii) Required probability = $\frac{C_1^3 C_1^8}{C_2^{20}}$ 1M
 $= \frac{12}{95}$ 1A
- (iii) Required probability = $\frac{C_2^{13}}{C_2^{20}}$ 1M
 $= \frac{39}{95}$ 1A
- (b) Required probability = $\frac{14}{95} \times \frac{3}{18} + \left(\frac{12}{95} + \frac{39}{95} \right) \times \frac{4}{18}$ 1M+1A
 $= \frac{41}{285}$ 1A
8. (a) Required probability = $(50\%)[(0.4)^2 + 2(0.5)(0.1)] + (20\%)(0.5)^3$
 $= 0.155$ 1A
- (b) (i) Required probability = $(30\%)(0.1) + (50\%)[(0.5)^2 + 2(0.5)(0.4)] + 0.155$ 1M
 $= 0.51$ 1A
- (ii) Required probability = $(20\%)[(0.1)^3 + 3(0.4)(0.1)^2]$ 1M
 $= 0.0026$ 1A
- (c) Expected value = $10(0.51) + 100(0.0026) + 20[1 - 0.51 - 0.0026 - (30\%)(0.5 + 0.4)]$ 1M+1M
 $= \$9.708$ 1A

9. (a) Number of possible orders = $5! = 120$ 1A
- (b) Required probability = $\frac{1}{4!}$ 1M
 $= \frac{1}{24}$ 1A
- (c) Required probability = $\frac{C_3^4}{4!}$ 1M
 $= \frac{1}{6}$ 1A
- (d) Required probability = $\frac{1}{5} \times \frac{C_2^4}{4!} + \frac{2}{5} \times \frac{1}{6} + \frac{2}{5} \times \frac{1}{24}$ 1M+1A
 $= \frac{2}{15}$ 1A
- (e) Required probability = $\frac{\frac{1}{5} \times \frac{C_2^4}{4!}}{\frac{2}{15}}$ 1M
 $= \frac{3}{8}$ 1A