

HW 1

a) Probability that the mark assignment is correct.

~~Answer~~

$$\begin{aligned}
 P(B_2 | \text{got 2 marks}) &= \frac{P(B_2 \cap \text{got 2 marks})}{P(\text{got 2 marks})} \\
 &= \frac{P(\text{got 2 marks} | B_2) \cdot P(B_2)}{P(\text{got 2 marks})} \\
 &= \frac{{}^3C_2 (0.6)^2 \times 0.4 \times 0.3}{{}^3C_2 (0.4)^2 \times 0.1 \times 0.4 + 0.6^2 \times 0.4 \times 0.3 + 0.5^3 \times 0.2 + 0.2^2 \times 0.8 \times 0.1} \\
 &= 0.416 \quad \underline{\underline{(A)}}
 \end{aligned}$$

b) $P(B_2 | \text{got 1 mark}) + P(B_2 | \text{got 2 mark}) + P(B_2 | \text{got 3 marks})$

↓

known = 0.4162

$P(B_2 | \text{got 1 mark})$

we proceed as above & get,

$$\begin{aligned}
 &{}^3C_2 (0.6)(0.4)^2 \times 0.3 \\
 &\frac{{}^3C_2}{2} (0.1 \times 0.1)^2 \times 0.4 + 0.3 \times 0.6 \times (0.4)^2 + 0.2 \times 0.5^2 \\
 &\quad + 0.1 \times 0.2 \times (0.8)^2) \\
 &= 0.4103
 \end{aligned}$$

$P(B_2 | \text{got 3 marks})$

$${}^3C_3 (0.6)^3 \times 0.3$$

$$\begin{aligned}
 &{}^3C_3 (0.9^3 \times 0.4 + 0.3 \times 0.6^3 + 0.2 \times 0.5^3 + 0.1 \times 0.2^3) \\
 &= 0.1696
 \end{aligned}$$

adding them up.

$$0.4103 + 0.1696 + 0.4192$$

$$= 0.995 \quad \text{(A)}$$