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ECM1419DA exam

1) a.i) $A = \begin{pmatrix} 0.3 \\ 0.5 \\ 0.4 \end{pmatrix}$

ii) $B = (8000 \quad 12000 \quad 6000)$

iii) $B \times A = 0.3 \times 8000 + 0.5 \times 12000 + 0.4 \times 6000$

$= 10800$

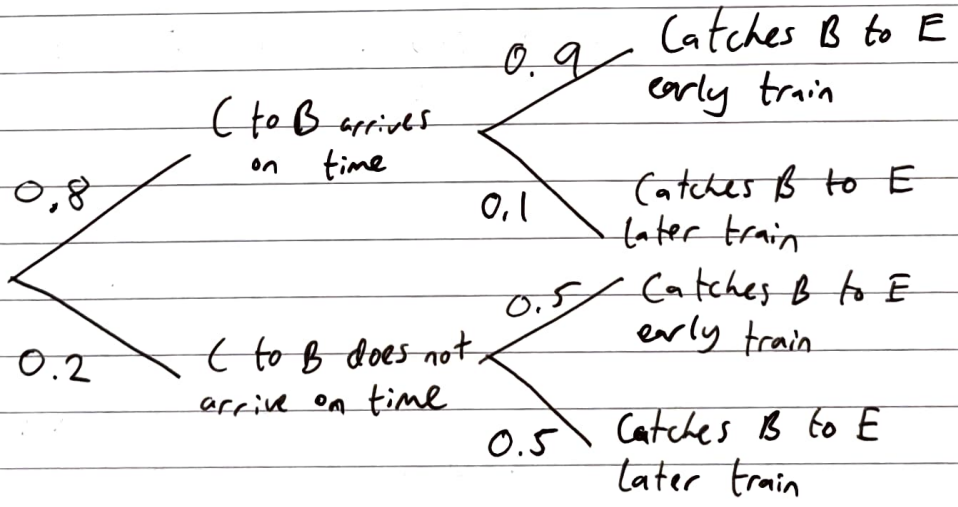
Total budgeted gross profit = £10800

iv) $C = (10000 \quad 6000 \quad 5000)$

$D = (10000 - 8000 \quad 6000 - 12000 \quad 5000 - 6000)$

$= (2000 \quad -6000 \quad -1000)$

c. i)



ii) $P(\text{B to E early train}) = 0.8 \times 0.9 + 0.2 \times 0.5$

$= 0.82$

~~iii) P(Not being late) =~~

iii) $P(\text{Not being late both times}) = 0.82^2 = 0.6724$

$P(\text{Being late at least once}) = 1 - 0.6724$

$= 0.3276$

d. i)

Type of gear	Frame size (cms) 51	54	56	57
Derailleur	•	•	•	•
Hub-type	•	•	•	•

ii) A) 8/10

B) 7/9

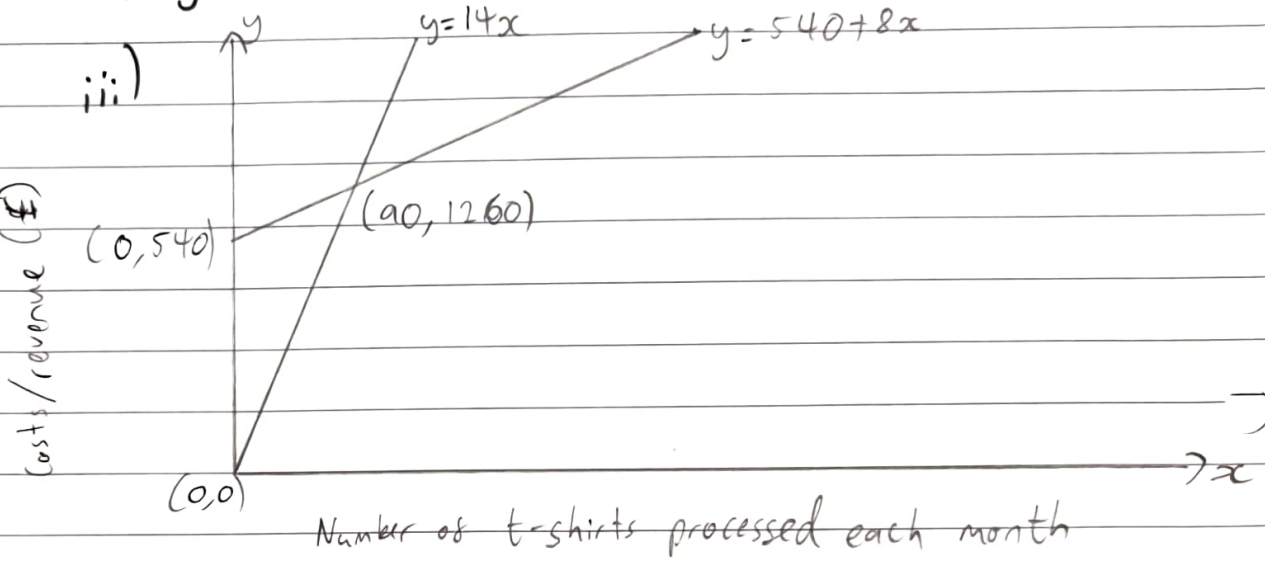
C) $\frac{8}{10} \times \frac{7}{9} = \frac{28}{45}$

~~2) a. i) Total costs per month =~~

2) a. i) $y = 540 + 8x$

ii) $y = 14x$

iii)



Intersection point:

$540 + 8x = 14x$

$6x = 540$

$x = 90$

$y = 14(90) = 1260$

b. (1) $\times 2$:

$6x - 4y = 12$

$4y = 6x - 12 \quad (3)$

Sub (3) into (2):

$6x - 12 - 5x = -8$

$x = 4$

Sub $x = 4$ into (3):

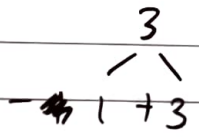
$4y = 6(4) - 12$

$= 12$

$y = 3$

c. Divide by 5:

$x^2 + 2x - 3 = 0$



$(x-1)(x+3) = 0$

$x = 1$ or $x = -3$

d. Multiply by 12

$4(7z+1) + 6(5-3z) = 3(5z+3)$

$28z + 4 + 30 - 18z = 15z + 9$

$5z = 25$

$z = 5$

e. $6 - 3y = \frac{1}{5x}$

$5x = \frac{1}{6-3y}$

$x = \frac{1}{30-15y}$

f. (1) = (2)

$3x^2 + 1 = 4x + 3$

$3x^2 - 4x - 2 = 0$

g. $x = \dfrac{-(-3) \pm \sqrt{(-3)^2 - 4(5)(-2)}}{2(5)}$

$= \dfrac{3 \pm 7}{10}$

$x = \dfrac{10}{10} = 1$ or $x = -\dfrac{4}{10} = -\dfrac{2}{5}$

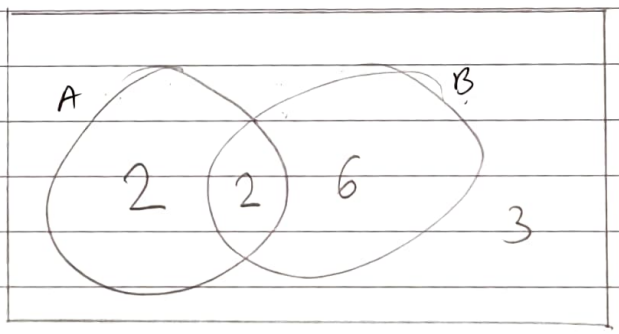
3) a. i) $C = \{11116, 11235, 13997\}$

Note: Since total spend is rounded to the nearest £, we cannot be sure if 12099 belongs to set C or not. I will assume it does not.

ii) $B \cap C = \{11116, 13997\}$

iii) $A \cup B = \{10034, 11116, 11235, 12099, 12462, 12836, 13123, 13483, 13825, 13997\}$

iv)



b. i) 3

ii) 4

iii) 4

iv) $\sigma = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$

~~$\Sigma x^2 = 2^2 \times 4 + 3^2 \times 7 + 4^2 \times 6 + 5^2 \times 4 + 7$~~

$\Sigma x^2 = 2^2 \times 4 + 3^2 \times 7 + 4^2 \times 6 + 5^2 \times 4 + 6^2 \times 4 + 7^2$

$= 468$

$\sigma = \sqrt{\frac{468}{26} - 4^2}$

$= 1.41$ (2 d.p.)

v) The doubling of the standard deviation means the ~~number~~ spread ~~[illegible]~~ of the number of tables booked each day is larger. This suggests less certainty for the restaurant, since they are less likely to ~~[illegible]~~ have a consistent set of customers booking each day.

c.

0	3 4 6 6 7 8 8 9
1	0 0 1 2 2 3 4 5 5 5 6 9
2	0 1 2 5 6 9
3	1 1 2 3