Math Test

Name : Maanya
Start : 08:14
End : 09:19

85/88

Q1)

a) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ M1
$= P(A) + P(A' \cap B) + P(A \cap B) - P(A \cap B)$ M1A1
$= P(A) + P(A' \cap B)$

b)(i) $P(A \cup B) = P(A) + P(A' \cap B)$ M1
$= P(A) + P(B|A')P(A')$
$\frac{4}{9} = P(A) + \frac{1}{6}(P(A'))$
$\frac{4}{9} = P(A) + \frac{1}{6}(1 - P(A))$ (1s) A1
$8 = 18P(A) + 3 - 3P(A)$
$5 = 15(P(A))$
$P(A) = \frac{1}{3}$ AG

(ii) $P(B) = P(A \cap B) + P(A' \cap B)$ M1
$= P(B|A)P(A) + P(B|A')P(A')$ M1
$= \frac{1}{3} \times \frac{1}{3} + \frac{1}{6} \times \frac{2}{3}$
$= \frac{2}{9}$ A1

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Q2)

a) $1 - \left(\frac{1}{18} + \frac{3}{18} + \frac{1}{18} + \frac{2}{18} + \frac{7}{18}\right)$
$= \frac{4}{18}$ A1

b) $\frac{-3}{18} - \frac{4}{18} + 0 + \frac{1}{18} \times \frac{4}{18} + \frac{35}{18}$ M1
$= \frac{33}{18}$ A1

i) The only sum is $-3 + 0$ or $0 + (-3)$
$2 \times \frac{1}{18} \times \frac{3}{18}$ M1M1
$= \frac{1}{54}$ A1

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Q3)

a) $10 \times (1 - 0.2) = 10 \times 0.8$ M1

$= 8$ A1

b) GDC → Binomial distribution BPD M1

$p = 0.0881$ (3 s.f.) A1

c) upper = 6 $p = 0.8$ A1

lower = 0 numtrial = 10

$p = 0.121$ (3 s.f.) A1

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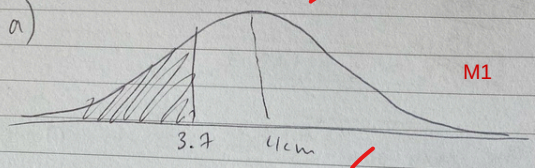
Q4) $X \sim N(4, 0.25^2)$

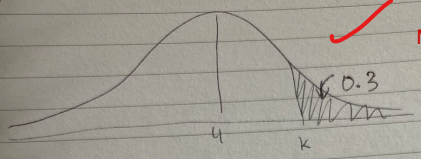
a)



M1

$p = 0.115$ (3 s.f.) A1

b)

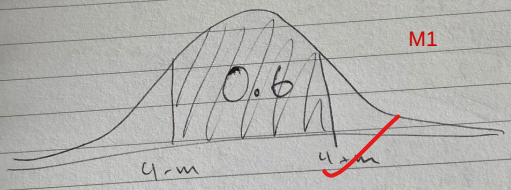


M1

InvN func on GDC

$k = 4.13$ (3 s.f.) A1

c)



M1

InvN:

$4 - m = 3.7895946$

$m = 0.210$ (3 s.f.) A1

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Q5) a) 17+25 = 42

$\frac{42}{130}$ A1

b) P(Arts | accepted)

$\frac{P(\text{Arts} \cap \text{Accepted})}{P(\text{Accepted})}$

$= \frac{17}{17+25}$ A1A1

$= \frac{17}{42}$

c) 17+24 = 41

$\frac{41}{130} \times \frac{40}{129} = \frac{1640}{16770}$ A1M1A1

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Q6)

a) A2

t	1	2	3	4	5	6
P(T=t	1/36	3/36	5/36	7/36	9/36	11/36

b) (i) $\frac{32}{36}$ A1

(ii) $\frac{\frac{11}{36}}{32/36} = \frac{11}{32}$ M1A1

c) $1 \times \frac{1}{36} + 2 \times \frac{3}{36} \ldots + 6 \times \frac{11}{36}$ M1

$= \frac{161}{36}$ A1

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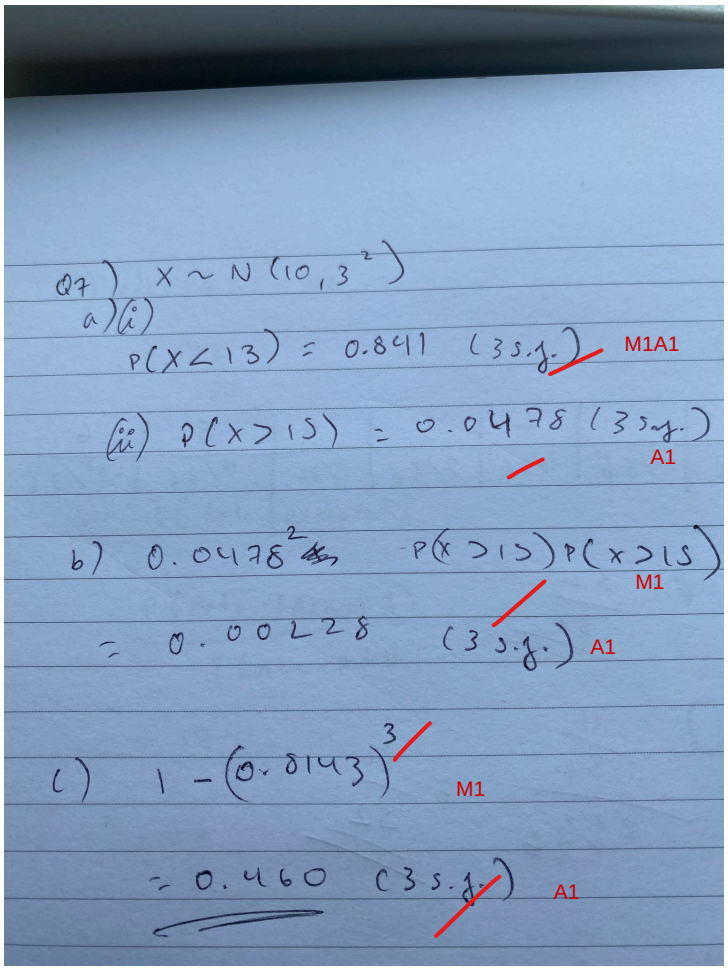


Q7) $X \sim N(10, 3^2)$

a)(i)

$P(X < 13) = 0.841$ (3 s.f.) M1A1

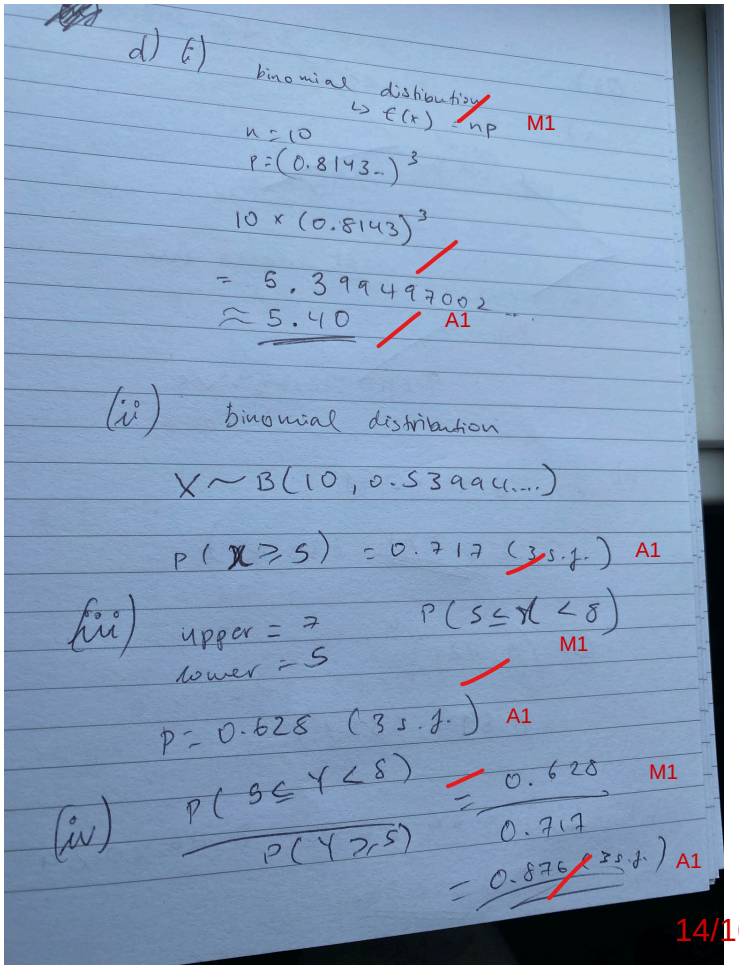
(ii) $P(X > 15) = 0.0478$ (3 s.f.) A1

b) 0.0478^2 $P(X > 15) P(X > 15)$ M1

$= 0.00228$ (3 s.f.) A1

c) $1 - (0.8143)^3$ M1

$= 0.460$ (3 s.f.) A1



d) (i) binomial distribution

$\hookrightarrow E(x) = np$ M1

$n = 10$

$p = (0.8143...)^3$

$10 \times (0.8143)^3$

$= 5.39449702...$

≈ 5.40 A1

(ii) binomial distribution

$X \sim B(10, 0.5394...)$

$P(X \geq 5) = 0.717$ (3 s.f.) A1

(iii) upper = 7

lower = 5

$P(5 \leq X < 8)$ M1

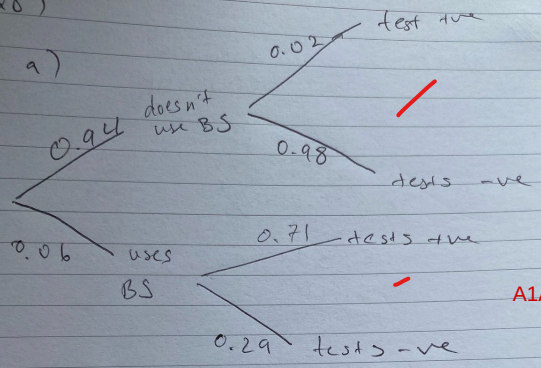
$p = 0.628$ (3 s.f.) A1

(iv) $\frac{P(5 \leq Y < 8)}{P(Y \geq 5)} = \frac{0.628}{0.717}$ M1

$= 0.876$ (3 s.f.) A1

Q8)

a)



A1A1

b) (i) 0.94×0.98

$= 0.921$ (3 s.f.) M1A1

(ii) $(0.921)^2$ A1

$= 0.849$ (3 s.f.) A1

c) (i) $0.94 \times 0.02 + 0.06 \times 0.29$ A1M1

$= 0.0362$ A1

(ii) 0.0362×1300 M1

$= 47.1$ (3 s.f.) A1

d) $p = 0.98$ A1

$n = 20$ M1

$X = 20$ M1

GDC binomial distribution

0.668 (3 s.f.) A1

e) $P(X \leq 17)$ M1

$p = 0.98$

$n = 20$

$x = 20$

0.00707 (3 s.f.) A1

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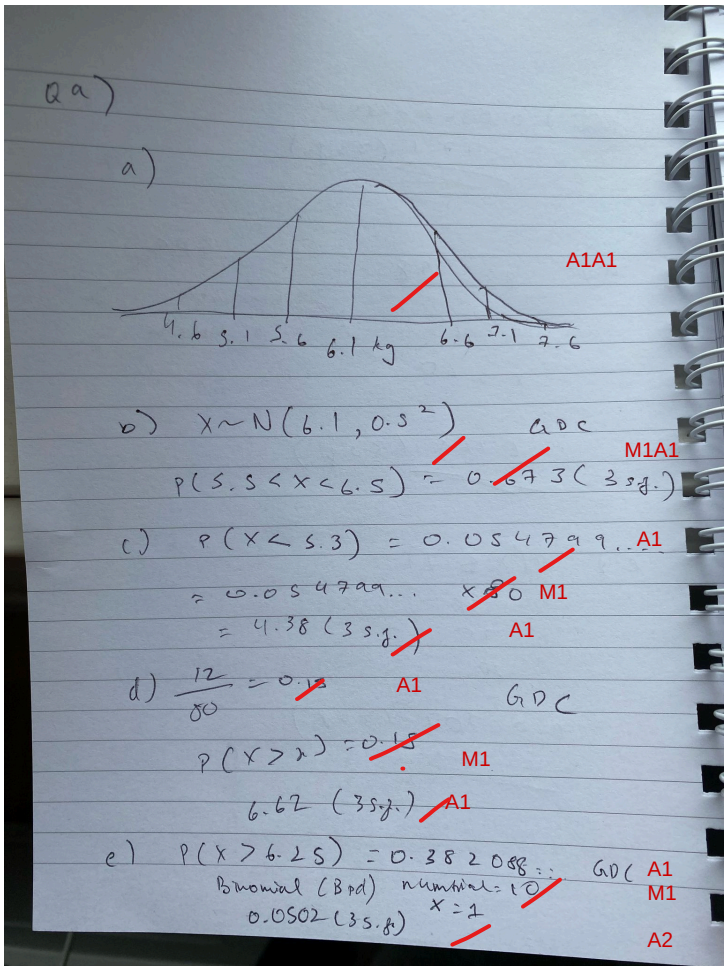
Qa)
a)
A1A1
4.6 5.1 5.6 6.1 kg 6.6 7.1 7.6
b) X ~ N(6.1, 0.5²) GDC
M1A1
P(5.5 < X < 6.5) = 0.673 (3sf.)
c) P(X < 5.3) = 0.0547991... A1
= 0.0547... x80 M1
= 4.38 (3 s.f.) A1
d) 12/80 = 0.15 A1 GDC
P(X > x) = 0.15 M1
6.62 (3sf.) A1
e) P(X > 6.25) = 0.382088... GDC A1
Binomial (B, pd) numtrial: 10 M1
0.0502 (3 s.f.) x = 1 A2