63
63

Math Test

Name: Manny
Start: 08:05
End: 09:00

Q1)

a) (i)

	1	2	3
1	2	3	4
2	3	4	5
3	4	5	6

9 possibilities

$\frac{1}{9}$ A1

(ii) score of 2 = $\frac{1}{9}$

$1 - \frac{1}{9} = \frac{8}{9}$ M1A1

b) (i) $\frac{1}{9} \times \frac{1}{9} = \frac{1}{81}$ M1A1

(ii) $P(2)P(2) + P(3)P(3) + P(4)P(4) + P(5)P(5) + P(6)P(6)$

$\frac{1}{9}\times\frac{1}{9} + \frac{2}{9}\times\frac{2}{9} + \frac{3}{9}\times\frac{3}{9} + \frac{2}{9}\times\frac{2}{9} +$

$\frac{1}{9}\times\frac{1}{9}$ M1

$= \frac{19}{81}$ A1

c) (i) $P((a,b,c,d) \mid a,b,c,d = 1,2)$

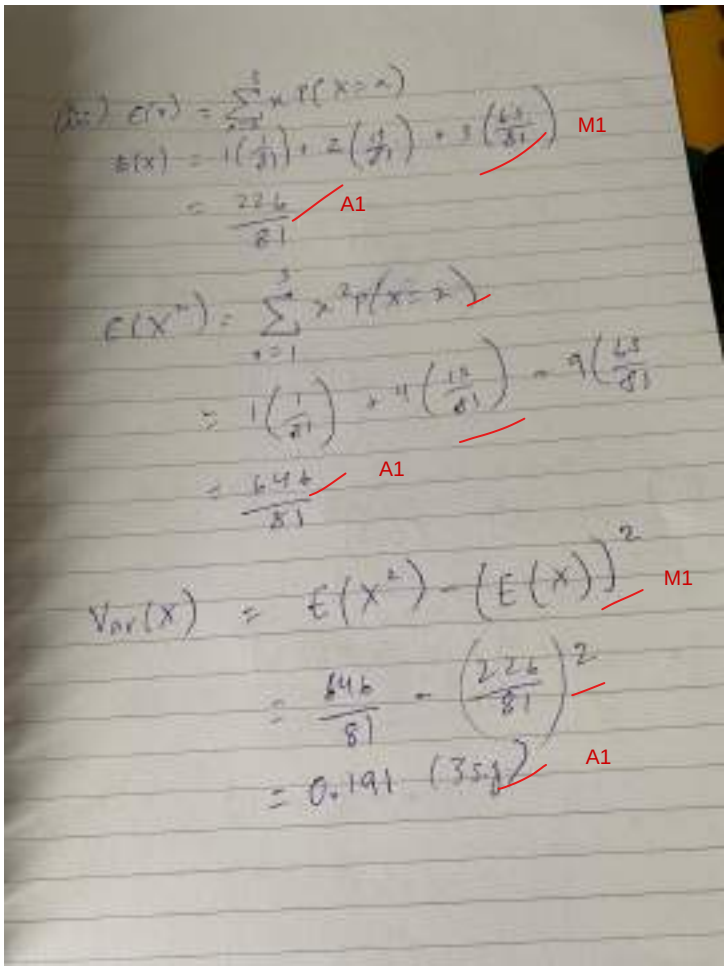
$P(X \le 2) = \frac{2}{3}\times\frac{2}{3}\times\frac{2}{3}\times\frac{2}{3}$ M1A1

$= \frac{16}{81}$ AG

(ii)

x	1	2	3
$P(X=x)$	1/81	15/81	65/81

A1A1



(iii) $E(X) = \sum_{x=1}^{3} x\,P(X=x)$

$E(X) = 1\left(\frac{1}{81}\right) + 2\left(\frac{16}{81}\right) + 3\left(\frac{64}{81}\right)$ M1

$= \frac{226}{81}$ A1

$E(X^2) = \sum_{x=1}^{3} x^2 P(X=x)$

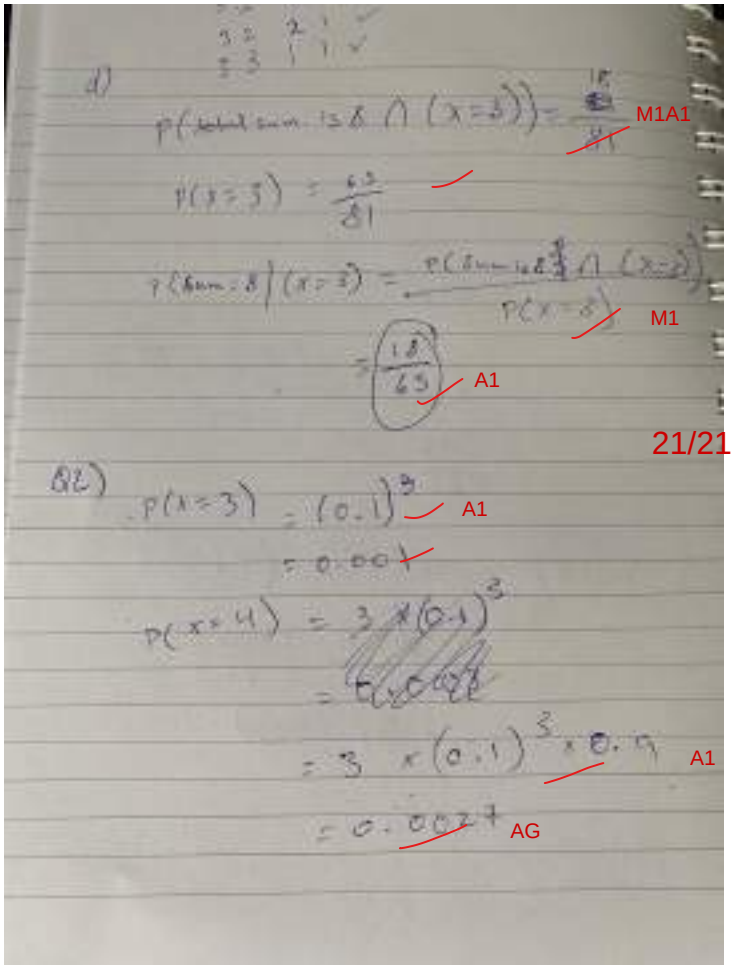
$= 1\left(\frac{1}{81}\right) + 4\left(\frac{16}{81}\right) + 9\left(\frac{64}{81}\right)$

$= \frac{646}{81}$ A1

$Var(X) = E(X^2) - (E(X))^2$ M1

$= \frac{646}{81} - \left(\frac{226}{81}\right)^2$

$= 0.191\ (3sf)$ A1



d)

$P(\text{total sum} = 8 \cap (X=3)) = \frac{15}{81}$ M1A1

$P(X=3) = \frac{63}{81}$

$P(\text{sum}=8 \mid X=3) = \frac{P(\text{sum}=8 \cap (X=3))}{P(X=3)}$ M1

$= \frac{15}{63}$ A1

21/21

B2)

$P(X=3) = (0.1)^3$ A1

$= 0.001$

$P(X=4) = 3 \times (0.1)^3$

$= 3 \times (0.1)^3 \times 0.9$ A1

$= 0.0027$ AG

b)

$\frac{9 + 3a + b}{2000} = 0.001$ M1A1

$\frac{16 + 4a + b}{2000} \times \frac{9}{10} = \frac{27}{10000}$ A1

$a = -3$ M1A1

$b = 2$

c) $P(X = n) = \frac{n^2 - 3n + 2}{2000} \times 0.9^{n-3}$ M1

$\frac{(n-1)(n-2)}{2000} \times 0.9^{n-3}$

$P(X = n-1) = \frac{(n-2)(n-3) \times 0.9^{n-4}}{2000}$ A1

$\frac{P(X = n)}{P(X = n-1)} = \frac{(n-1)(n-2)}{(n-2)(n-3)} \times 0.9$ A1

$= \frac{0.9(n-1)}{n-3}$ AG

d) and e) : N/A

12/12

Q3) a) $P(L \geq 5) = 0.910$ M1A1

b)

atleast 5 years old [illegible]

[illegible] Binomial distribution

$X \sim B(8, 0.910)$ M1

$P(X > 6) = 1 - P(X \leq 6)$ M1

$= 0.843$ A1

5/5

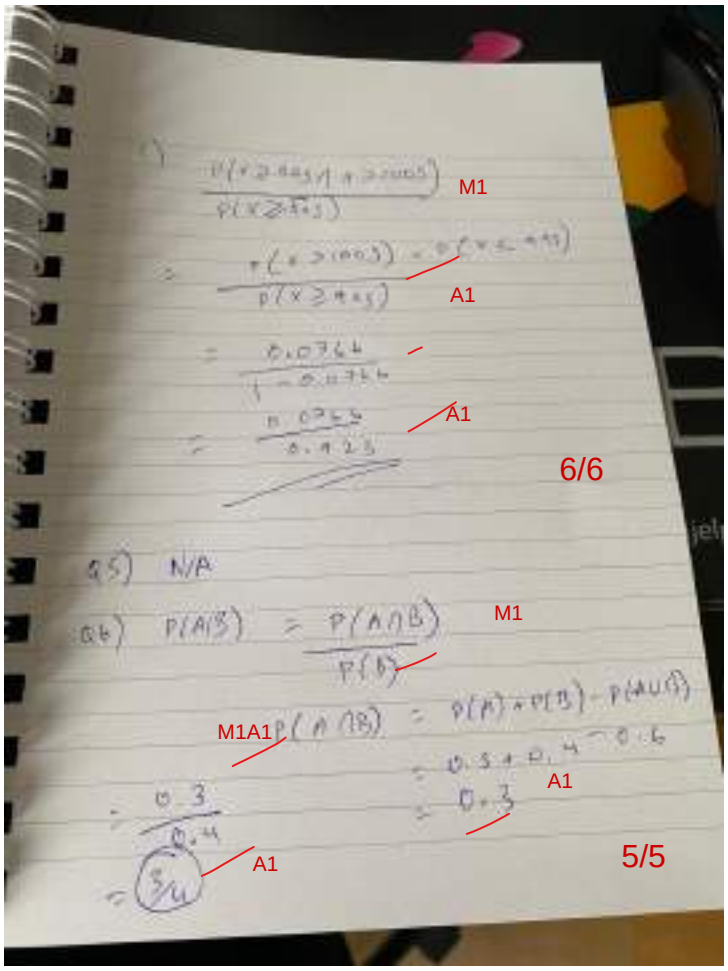
Q4) a) $P(X < 985) = 0.07656372$ M1

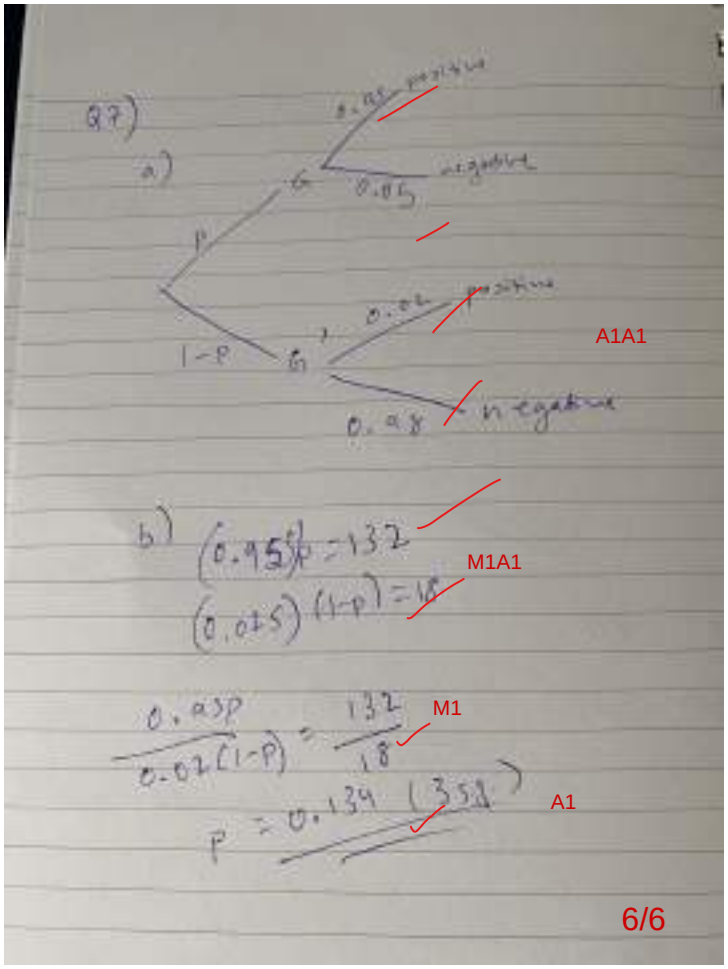
≈ 0.0766 A1

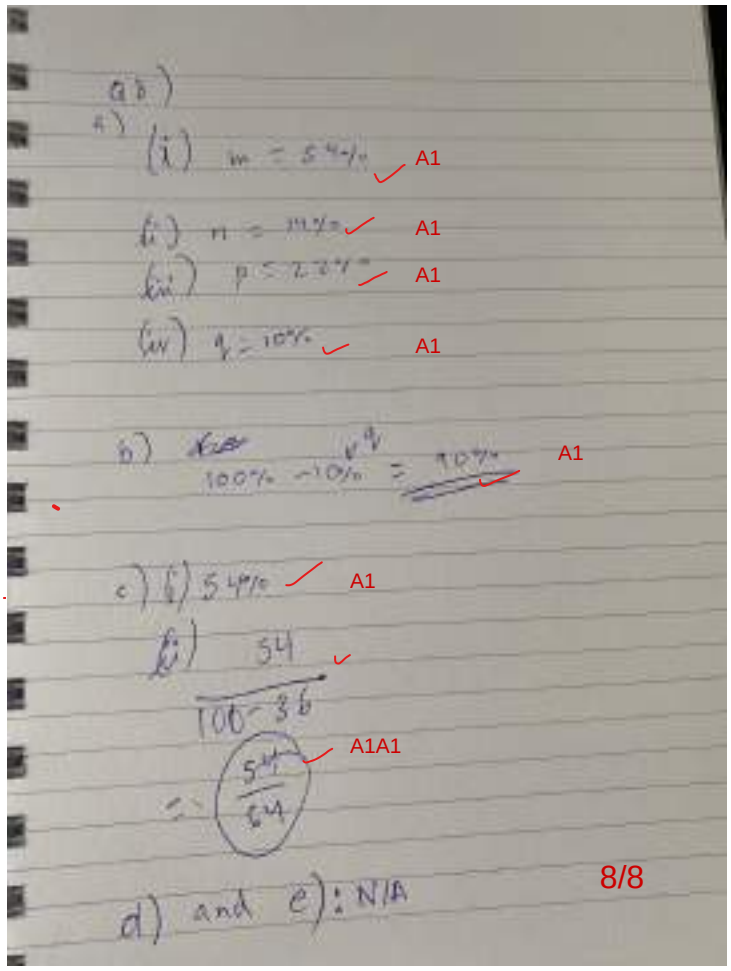
b) 0.0766×100

$= 7.66$

≈ 8 [illegible] A1


M1
A1
A1
6/6
Q5) N/A
Q6) P(A|B) = P(A∩B) / P(B)
M1
M1A1
P(A∩B) = P(A) + P(B) - P(A∪B)
= 0.5 + 0.4 - 0.6
= 0.3
A1
= 0.3 / 0.4
= 3/4
A1
5/5


Q7)
a)
G
0.05
negative
P
1-P
G
0.02
positive
A1A1
0.98
negative
b)
(0.95)P = 132
(0.05)(1-P) = 18
M1A1
0.95P / 0.02(1-P) = 132 / 18
M1
P = 0.139 (3SF)
A1
6/6


a b)
a)
(i) m = 54% A1
(ii) n = 36% A1
(iii) p = 20% A1
(iv) q = 10% A1
b) 100% - 10% = 90% A1
c) i) 54% A1
ii) 54
100 - 36
A1A1
54/64
d) and e): N/A
8/8