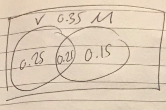
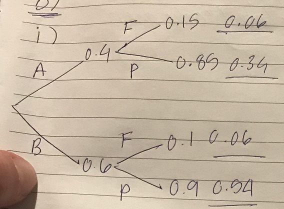
a)



i) $P(V \cup M \cup \cancel{V} \cap M) = 0.65$
ii) $P(V' \cap M') = 0.35$
iii) $P(V \cap M') = 0.25$
iv) $P(M | V) = 0.25 / 0.4 = 0.625$

b)
i)



ii) $P(F) = 0.06 + 0.06$
$= 0.12$
$= 12\%$

iii) $P(F | AF) = 0.06 / 0.12$
$= 0.5$
$= 50\%$

iv) $O(F | AF) = \cancel{\quad} \frac{0.5}{1 - 0.5}$
$= 1 : 1$

v) Events A and B are independent if $P(A \cap B) = P(A) \times P(B)$
let A = fail test
let B = made by machine A

$0.06 = 0.12 \times 0.4$
$0.06 \neq 0.048$
hence, fail the test and made by machine A is not independent event

c) i) poisson distribution
- how many time event (mythical creature) occurs in time period
- occurrence calculated in fixed time period ("given time period")
- events occur independently ("creatures independently captured")
- events occur one at a time ("only one at a time")

ii) $P(X=5) = \frac{\mu^x e^{-\mu}}{x!}$

$P(X=5) = \frac{4.5^5 e^{-4.5}}{5!}$

$P(X=5) = 0.1708$

iii) $\sqrt{\mu_x} = \sigma x$

$\sigma x = \sqrt{4.5}$
$= 2.1213$

iv) —

d) $E(\hat{p}) = \frac{E(x)}{n}$

i) $E(\cancel{X}) = \frac{1}{200} \times (0 \times 34 + 1 \times 40 + \ldots + 4 \times 6)$

$E(X) = 1.8$

$E(\hat{p}) = \frac{1.8}{4}$
$= 0.45$

ii) $P(X=x) = \binom{n}{x} p^x q^{n-x}$ & $q = \cancel{p} - p$

$P(X=3) = \binom{4}{3} \times 0.45^3 \times 0.55^1$

$P(X=3) = \left(\frac{4!}{3!\,1!}\right) \times 0.45^3 \times 0.55^1$

$P(X=3) = 0.2005$

iii)

x	0	1	2	3	4
e_i	18.3	59.9	73.9	40.1	8.2

$X^2 = \sum_{i=0}^{4} \frac{(f_i - e_i)^2}{e_i}$

$X^2 = \frac{(34-18.3)^2}{18.3} + \frac{(40-59.9)^2}{59.9} + \ldots + \frac{(6-8.2)^2}{8.2}$

$X^2 = 28.203$

$V = K - 1 - n$ no. of parameters

$V = 5 - 1 - 1$

$V = 3$

$X^3_{0.05} = 7.81$

$X^2 > X^3_{0.05}$ $\therefore$ the poisson distribution is not an appropriate distribution for the model