1) Cards = 52

$P(\text{Heart}) = \frac{13}{52}$

$P(\text{Diamond}) = \frac{13}{52}$

$P(\text{Spade}) = \frac{13}{52}$

$P(\text{one card Diamond, one card Heart, one card Spade}) = P(\text{Heart}) \times P(\text{Diamond}) \times P(\text{Spade})$

$= \frac{13}{52} \times \frac{13}{52} \times \frac{13}{52} = \frac{{}^{13}C_1 \times {}^{13}C_1 \times {}^{13}C_1}{{}^{52}C_3}$

$= \frac{1}{64} = 0.0165$

$= \frac{13 \times 13 \times 13}{52 \times 51 \times 50 / 3 \times 2 \times 1} = \frac{169}{6800}$

2) Action movies = 42%.

Drama movies = 36%.

Horror movies = 12%.

comedy movies = 54%.

total = 144

$P(\text{action or drama}) = P(\text{action}) + P(\text{drama})$

$= \frac{42}{144} + \frac{36}{144} = \frac{78}{144}$

$P(\text{action or drama}) = 0.546$

$P(\text{comedy or horror}) = P(\text{comedy}) + P(\text{horror}) - P(\text{comedy \& horror})$

$= \frac{54}{144} + \frac{12}{144} - 0$

$P(\text{comedy or horror}) = \frac{66}{144}$

$= 0.4583$

3)

Red	3
Black	5

white	4
Black	7

$P(A) = P(B) = 1/2$

$P\left(\frac{Bl}{A}\right) = \frac{5}{8}$

$P\left(\frac{Bl}{B}\right) = \frac{7}{11}$

$$P\left(\frac{B}{Bl}\right) = \frac{P(B) \times P\left(\frac{Bl}{B}\right)}{P(A) \times P\left(\frac{Bl}{A}\right) + P(B) \times P\left(\frac{Bl}{B}\right)}$$

$$= \frac{\frac{1}{2} \times \frac{7}{11}}{\left(\frac{1}{2} \times \frac{5}{8}\right) + \left(\frac{1}{2} \times \frac{7}{11}\right)}$$

$$= \frac{\frac{7}{11}}{\frac{5}{8} + \frac{7}{11}}$$

$$= \frac{7}{11} \times \frac{88}{111}$$

$$= \frac{56}{111}$$

$$\simeq 0.50450$$

4) 450 Application in 1 hour

By poisson Distribution

a) $\lambda = \frac{450}{60}$

$\lambda = \frac{15}{2}$

$\lambda = 10$

$P(x=x) = \frac{e^{-15/2} \left(\frac{15}{2}\right)^{16}}{16!}$

$= 0.0858.$

b) $P(x \geq 17) = 1 - P(x \leq 17)$

$x = \frac{17}{2}$

$x = \frac{15}{2}$

$P(x \geq 17) = 1 - \frac{17}{450}$

$P(x \geq 17) = \frac{e^{-15/2} \cdot \left(15/2\right)^{17}}{17!}$

$= 0.6321$

b) $z = \frac{x - \mu}{\sigma}$

$0.675 = \frac{x - 350870}{12405}$

$x = 350870 + (0.675 \times 12405)$

$x = 359237.045$

75th percentile = 359237.045.