1.

$P(A)$ = probability that symtomatic patients aged 50 - 60 will be hospitalized

$P(B)$ = probability that symtomatic patients aged 65 + will be hospitalized

$P(A) = 0.28$

$P(B) = 0.42$

a. $$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
$$= 0.28 + 0.42 - (0.28)(0.42)$$
$$= 0.5824$$

b. $$P(A^c \cap B) = P(B) - P(A \cap B)$$
$$= 0.42 - (0.28)(0.42)$$
$$= 0.3024$$

2.

$P(A)$ = probability that a residence is a house $= 0.65$

$P(A^c)$: probability that a residence is a condo $= 0.35$

$P(B)$ = probability that a residence uses natural gas $= ?$

$P(B|A) = 0.3$

$P(B|A^c) = 0.6$

a. $P(B) = ?$

$$P(B) = P(A)P(B|A) + P(A^c)P(B|A^c)$$
$$= (0.65)(0.3) + (0.35)(0.6)$$
$$= 0.405$$

b. $P(A^c|B) = ?$

$$P(A^c|B) = \frac{P(A^c \cap B)}{P(B)} = \frac{(0.35)(0.6)}{0.405} = 0.5185$$

3. P(A) = probability that donors who book appointments will cancel = 0.08

P(B) = probability that ~~donors~~ who book appt. will no show (without cancelling) = 0.03

a. P(A) and P(B) are mutually exclusive

$$P(A \cup B) = P(A) + P(B) = 0.11$$

b. Define X = number of people not attending their donation appt.

$N = 20 \quad p = 0.11 \quad x = 5$

$$P(x=5) = \binom{N}{x} p^{x} (1-x)^{(N-x)}$$

$$= \binom{20}{5} 0.11^{5} (1-0.11)^{(20-5)}$$

$$= 0.0435$$

c. $N = 60 \quad p = 0.11 \quad x = 8$

$\lambda = Np = 6.6$ and $\lambda < 7$ so it's OK to use poisson approx.

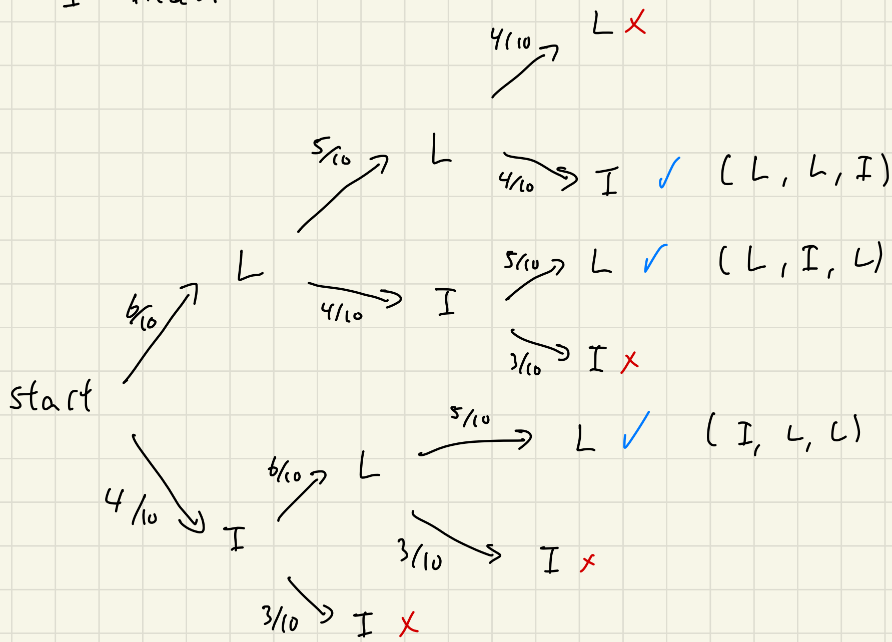
$$P(x=8) = e^{-\lambda} \frac{\lambda^{x}}{x!}$$

$$= e^{-0.11} \frac{0.11^{(8)}}{8!}$$

$$= 0.1215$$

4. L = LinkedIn

I = Indeed




In all cases, $2 \times L$ and $1 \times I$ has:

$$\frac{6}{10} \times \frac{5}{10} \times \frac{4}{10} = \frac{120}{1000} = 0.12$$

rate of occurring.

But there are three combinations, therefore:

$$0.12 \times 3 = 0.36$$

is the rate of selecting 2 LinkedIn resumes a.

P(having at least 1 maxed CC) =

P(homeowners w/ at least 1 maxed CC) +

P(home renters w/ at least 1 maxed CC)

$$= \frac{99}{362} + \frac{113}{362} = 0.586$$

b. P(homeowner owns house) =

P(homeowner w/ at least 1 maxed CC) +

P(homeowner w/o any maxed CC)

$$= \frac{99}{362} + \frac{70}{362} = 0.467$$

c. Yes, these are independent events.

If they were not (i.e. they are mutually exclusive),

then their probabilities should sum up to 1.

Since $0.586 + 0.467 = 1.053 > 1$, it is not

the case that not having at least 1 maxed CC means

that the household owns the house.

6. $p(k) = C(4-k)^3 \; ; \; k = 1,2,3$

a.

$P(1) = C(4-1)^3 = 27C$

$P(2) = C(4-2)^3 = 8C$

$P(3) = C(4-3)^3 = C$

Since $P(1) + P(2) + P(3) = 1$,

$1 = (27 + 8 + 1)C$

$\therefore C = \frac{1}{36}$

b. $P(X) = \frac{1}{36}(4-X)^3$

| $x$ | 1 | 2 | 3 |
|---|---|---|---|
| $P(X=x)$ | $3/4$ | $2/9$ | $\frac{1}{36}$ |

$\mu = E[X] = \sum_{x=1}^{3} x\,P(x) = (1)(3/4) + (2)(\frac{2}{9}) + (3)(\frac{1}{36})$

$= 1.25$ usb ports

c. $\sigma^2 = \sum_{x=1}^{3} (x-\mu)^2 P(x) = (1-1.25)^2(\frac{3}{4}) + (2-1.25)^2(\frac{2}{9}) + (3-1.25)^2(\frac{1}{36})$

$= 0.4226$ (usb ports)$^2$