Isaac Lee

problem 1.

10 people

$P(\text{Fail}) = 0.3$

a) $P(\boxed{\text{Pass}} \,\&\, \boxed{\text{Pass}} \,\&\, \cdots \,\&\, \boxed{\text{Pass}})$

$\overset{\text{indep}}{=} P(\text{Pass})^{10}$

$= (1 - P(\text{Fail}))^{10}$

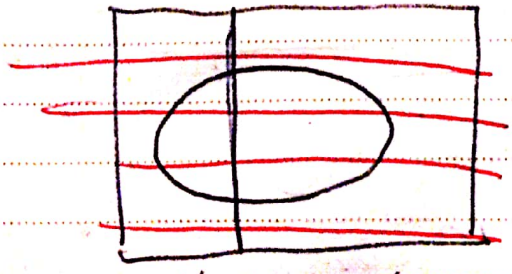
$= (0.7)^{10}$

b) $P(\text{At least 1 Fail})$

$= 1 - P(\text{All pass}) = 1 - (0.7)^{10}$

~~Problem 2.~~

~~Assume 100 students.~~



~~20% Slytherin~~ ~~80%~~

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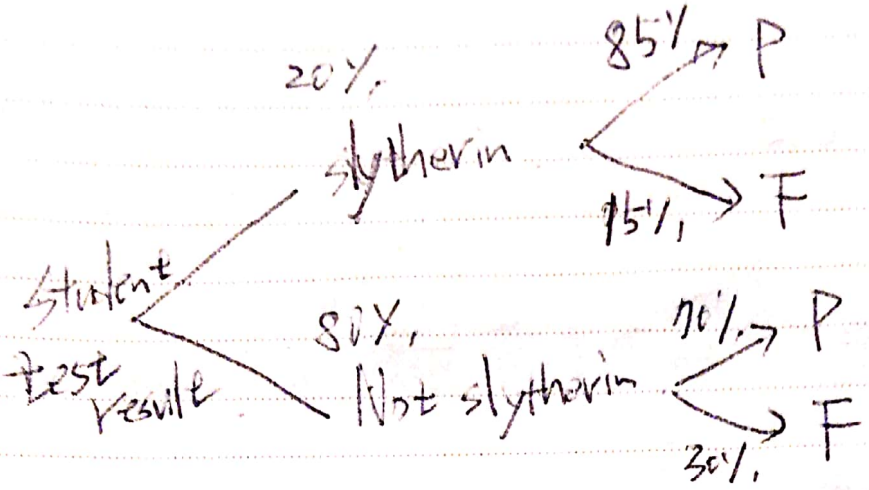
Problem 2.



(a)

$$P(\text{Not slyther} \,\&\, \text{Pass test})$$

$$= P(\text{Not slytherin})\, P(\text{Pass} \mid \text{Not slytherin})$$

$$= 0.8 \times 0.7$$

(b) $P(\text{Not Slytherin} \mid \text{Pass})$

$$= \frac{P(\text{Not Slytherin} \cap \text{Pass})}{P(\text{Pass})}$$

$$= \frac{\cancel{P(\text{Not}} \; 0.8 \times 0.7}{0.8 \times 0.7 + 0.2 \times 0.85}$$

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Problem 3.

P(Daily Prophet or Quibbler)

disjoint ? $\begin{cases} \text{No} \rightarrow \text{General addition} \\ \text{Yes} \rightarrow \text{addition} \end{cases}$

G.A.

$= P(\text{Daily Prophet}) + P(\text{Quibler}) - P(\text{Daily \& Quibler})$

$= P(D) + P(Q) - \underbrace{P(D) \times P(Q)}_{\text{b/c indep.}}$

$= 0.75 + 0.20 - 0.75 \times 0.20$

$= 0.8$

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Problem 4.

$P(\text{Daily}) = 0.75$

$P(\text{Quibbler}) = 0.20$.

$P(\text{Daily} \mid \text{Quibbler}) = 0.10$

a) $P(\text{Daily} \& \text{Quibbler})$

$= P(\text{Quibbler}) \times P(\text{Daily} \mid \text{Quibbler})$

$= 0.20 \times 0.1 = 0.02$

b) $P(\text{Daily or Quibbler})$

$= P(\text{Daily}) + P(\text{Quibbler}) - P(\text{Daily} \& \text{Quibber})$

$= 0.25 + 0.20 - 0.02$

$= 0.93$.

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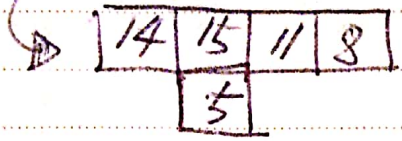
Problem 5.

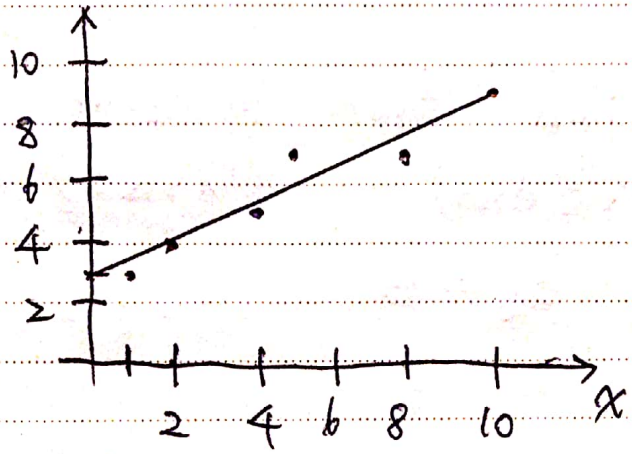
a) 14 / 48

b) (20 + 33) / 100



Problem 6.

a)



b) $y = b_0 + b_1 x$

$$b_1 = \frac{S_y}{S_x} \cdot r = \frac{2.19}{3.46} \times 0.95 \fallingdotseq 0.6$$

$$b_0 \fallingdotseq \bar{y} - b_1 \bar{x}$$

$$= 6 - (0.6) \times 5 = 3$$

$$\therefore y = 3 + 0.6x$$

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c) $\hat{y} = 3 + 0.6 \times 7$

$= 7.2$

d) Done

Problem 7.

480 people.

a) predict Final (y-axis) from Midterm (x axis)

$\bar{y} = 65$, $S_y = 15$ $r = 0.6$.

$\bar{x} = 55$, $S_x = 20$,

$\hat{y} = 40.25 + 0.45x$ (midterm).

b) $\hat{y} = 40.25 + 0.45 \times 80 = 76.25$.

c) take 0, 25. (Any pair works).

$\hat{y}_1 = 40.25 + 0.45 \times 0 = 40.25$.

$\hat{y}_2 = 40.25 + 0.45 \times 25 = 51.25$

$\therefore 11.25$.

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d) residual = obs. - predict

= 70 - predicted score = 70 - 67,25

= 2,75 points.

$\hat{y} = 40,55 \times 0,45 \times 60$

$= 67,25$

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