Probability Worksheet #8
October 10, 2018
2 Points

Circle one name.

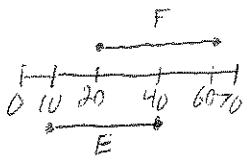
Name: Solutions **Name:** _____ **Name:** _____

Note: $P(E|F) = \frac{\text{size of } E \cap F}{\text{size of } F}$.
It is also true that $P(E|F) = \frac{P(E \cap F)}{P(F)}$.

1. Suppose a point is chosen at random from the sample space that is the interval $\Omega = [0, 70]$.
Let E be the event that the point is in the interval $[10, 40]$.
Let F be the event that the point is in the interval $[20, 60]$.

   (a) Determine $P(E|F)$.

   $\frac{\text{size of } (E \cap F)}{\text{size of } F}$

   $P(E|F) = \frac{20}{40}$

   (b) Determine $P(F|E)$.

   $\frac{\text{size of } (F \cap E)}{\text{size of } E}$ $P(F|E) = \frac{20}{30}$

2. A jar contains beads which are either blue or white, and either round or pointy. A bead is drawn at random. Let E be the event that the bead is blue. Let F be the event that the bead is pointy.

   (a) If there are 100 pointy beads and 35 blue pointy beads, determine $P(E|F)$.

   $\frac{35 \text{ - blue}}{100 \text{ - total}}$

   (b) If there are 100 pointy beads and $P(E|F) = 1/4$, determine the number of blue pointy beads.

   $\text{blue} = \text{total} \cdot \frac{1}{4}$
   $\text{blue} = 100 \cdot \frac{1}{4}$
   $\text{blue} = 25$

   $P(E|F) = \frac{\text{size of } (E \cap F)}{\text{size of } F}$ ← blue pointy beads / ← total pointy beads

   $\frac{1}{4} = \frac{\text{blue}}{\text{total}}$

   (c) If $P(E|F) = 1/5$ and there are 100 blue pointy beads, determine the number of pointy beads.

   $P(E|F) = \frac{\text{size of } (E \cap F)}{\text{size of } F}$ → $\text{blue} = \text{total} \cdot \frac{1}{5}$

   $\frac{1}{5} = \frac{\text{blue}}{\text{total}}$ $5(100) = (\text{total} \cdot \frac{1}{5})5$

   $500 = \text{total}$

3. A jar contains beads which are either blue or white, and either round or pointy. There are 200 beads total, with 40 of them being pointy.

	Round	Pointy	Total
Blue	140	6	146
White	20	34	54
Total	160	40	200

> add across

200 − 40 = 160

Suppose that:
P(Bead is White|Bead is Round) = 1/8, and
P(Bead is Blue|Bead is Pointy) = 3/20.
Fill in the table.

White Round: $\frac{1}{8} = \frac{x}{160}$

160 − 20 = 140 blue round beads

$160 = 8x$

$x = 20$ white round beads

Blue Pointy: $\frac{3}{20} = \frac{x}{40}$

40 − 6 = 34 white pointy beads

$120 = 20x$

$x = 6$ blue pointy beads