Probability Worksheet #2
September 24, 2018
2 Points

Circle one name.

Name: Saintfims **Name:** _____ **Name:** _____

Note: If A and B are two subsets of a set X, then:

- $\overline{A}$ is the set of members of X that are *not* in A (the *complement* of A).
- $A \cup B$ is the set of members of X that are in A *or* in B (*or both*) (the *union* of A and B).
- $A \cap B$ is the set of members of X that are in A *and* also in B (the *intersection* of A and B).

Here is a list of 123 beads sorted by color and shape.

	△	□	Total
Red	1	8	9
Green	64	16	80
Blue	2	32	34
Total	67	56	123

A single bead is drawn at random. Let E be the event "The bead is green," and F be the event "The bead is a square."

Determine:

1. $P(E)$, the probability that the bead is green $\frac{80}{123}$
2. $P(\overline{E})$, the probability that the bead is not green $\frac{43}{123}$
3. $P(F)$, the probability that the bead is a square $\frac{56}{123}$
4. $P(\overline{F})$, the probability that the bead is not a square $\frac{67}{123}$
5. $P(E \cup F)$, the probability that the bead is green or the bead is a square (or both) $\frac{120}{123}$
6. $P(E \cap F)$, the probability that the bead is green and is also a square $\frac{16}{123}$
7. Why does this make sense:

$$P(E \cup F) = P(E) + P(F) - P(E \cap F) = \frac{80}{123} + \frac{56}{123} - \frac{16}{123} = \frac{120}{123}$$

Adding the probability of picking a green bead [$P(E)$] and the probability of picking a square bead [$P(F)$] yields: $\frac{80}{123} + \frac{56}{123} = \frac{136}{123}$, which is impossible. This occurs because the probability of picking a bead that is both green and square [$P(E \cap F)$] is being counted twice. Therefore, to find the probability that you will pick a bead that is either green or square or both [$P(E \cup F)$], we must take away one instance of $P(E \cap F)$ so that we are only counting that combination once.