Name: _____

Math 123
Fall 2017
Dr. Lily Yen

Assignment 2
Show all your work

Number: _____

Signature: _____

Score: ___/20

Problem 1: Short answer questions, one mark each.

a. If the probability that your DVD player breaks down before the extended warranty expires is 0.067, what is the probability that the player will NOT break down before the warranty expires?

$$\boxed{0.933}$$

b. In a given year, $1\,877\,163$ males and $1\,736\,721$ females were born in a certain country. If a child is selected randomly from this group, what is the probability that the child is female?

$$\boxed{0.481}$$

c. The residents of a small town and the surrounding area are divided over the proposed construction of a dog park in town, as shown in the table. A reporter randomly selects a person to interview from a group of residents. If the person selected supports the dog park, what is the probability that the person lives in town?

	Support dog park	Oppose dog park
Live in town	7252	6316
Live in surrounding area	518	461

$$\boxed{0.933}$$

d. When you roll a pair of dice, what is the probability of getting a sum of at least 10?

$$\boxed{1/6}$$

e. When you draw a single card from a deck of 52 cards, what is the probability of getting either a spade or a queen?

$$\boxed{4/13}$$

f. Assume that A and B are events. If $P(A\cup B) = 0.7$, $P(A) = 0.3$, and $P(A\cap B) = 0.15$, find $P(B)$.

$$\boxed{0.55}$$

Score: /6

Problem 2: Write the event as a set of outcomes: *Red appears at least once when we spin two times a spinner which contains a third of red, a third of blue, and a third of yellow.*

$\{(R, R), (R, B), (R, Y), (B, R), (Y, R)\}$

Score: /2

Problem 3: A game has two four-sided dice having the numbers 7, 6, 3, and 8 on their faces. Outcomes in the sample space are pairs such as $(7, 3)$, and $(6, 6)$.

a. Draw the sample space.

$\big\{(3, 3), (3, 6), (3, 7), (3, 8), (6, 3), (6, 6), (6, 7), (6, 8),$
$\qquad\qquad (7, 3), (7, 6), (7, 7), (7, 8), (8, 3), (8, 6), (8, 7), (8, 8)\big\}$

b. Express the event "the total showing is an odd number" as a set.

$\big\{(3, 6), (3, 8), (6, 3), (6, 7), (7, 6), (7, 8), (8, 3), (8, 7)\big\}$

c. Find the probability that the total showing is more than 10.

$\big\{(3, 8), (6, 6), (6, 7), (6, 8), (7, 6), (7, 7), (7, 8), (8, 3), (8, 6), (8, 7), (8, 8)\big\}$, so $11/16$.

Score: /4

Problem 4: The table shows the age distribution of those who earned less than minimum wage in a recent year. If a worker is randomly selected from those surveyed, find the probability that the person is older than 34.

Age	Working below minimum wage
16–19	337 000
20–24	417 000
25–34	331 000
35–44	168 000
45–54	113 000
55–64	80 000
65 and older	37 000

$$\frac{398\,000}{1\,483\,000} = 0.268 = 26.8\,\%$$

Problem 5: The table relates the amount of time consumers engage in online shopping per month with their annual income. Find the probability that a randomly selected consumer either spends 0–2 hours per month shopping online OR has an annual income below $40 000.

Annual income	10 h or more	3 h–9 h	0 h–2 h	Total
Above $60 000	188	179	129	496
$40 000–$60 000	147	216	160	523
Below $40 000	129	188	253	570
Total	464	583	542	1589

$$\frac{542 + 570 - 253}{1589} = \frac{859}{1589} = 0.541 = 54.1\,\%$$

Problem 6: A candy jar contains 50 green jelly beans, 35 pink jelly beans, and 15 white jelly beans. Two jelly beans are randomly selected without replacement. Let G be the event *you select a green jelly bean first*, and let N be the event *the second jelly bean is not green*. Find $P(G \mid N)$.

The jar contains 100 beans. In event N, we know nothing about the first bean, so $P(N) = \frac{35+15}{100} = \frac{1}{2}$. Also, $P(G \text{ and } N) = \frac{50}{100} \times \frac{35+15}{99} = \frac{25}{99}$. Therefore $P(G \mid N) = \frac{P(G \text{ and } N)}{P(N)} = \frac{25/99}{1/2} = \frac{50}{99} \approx 0.505 = 50.5\,\%$.