Solutions - Practice Test 2

1. As a procedure is repeated, the relative frequency of an event tends to approach the theoretical probability. As a coin is tossed more and more times, the proportion of heads will approach 0.50.

2. a. {HHH, HTT, THT, TTH, HHT, HTH, THH, TTT}

   b. 1/8

3. $P(1^{st} \text{ is good and } 2^{nd} \text{ is good}) = \frac{88}{100} \cdot \frac{88}{100} = 0.774$

   ind. events (sampling with replacement)

   b. $P(1^{st} \text{ is good and } 2^{nd} \text{ is good}) = \frac{88}{100} \cdot \frac{87}{99} = 0.773$

   dependent events (sampling w/o replacement)

4. a. 0.40

   b. 0.60

   c. Yes. It is not possible to travel in-state and out-of-state simultaneously.

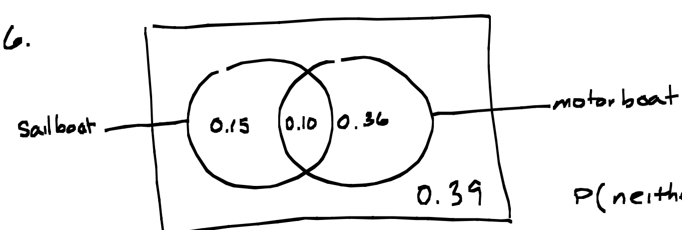
5. a. $(0.80)^4 = 0.4096$

   b. $(0.20)^4 = 0.0016$

   c. $P(\text{at least one male}) = 1 - P(\text{none male}) = 1 - P(\text{all female})$
   $= 1 - 0.4096 = 0.5904$
   ↑from part a

   d. $(0.20)(0.80)^3 = 0.1024$

6.



P(neither sailboat nor motorboat) = 0.39

7. a. $\frac{143}{610} = 0.234$

   b. $\frac{57}{320} = 0.178$

   c. These events are not independent.
   To be independent, P(stopping smoking) must equal the conditional probability P(stopping smoking | nicotine patch used). (In other words, the probability that someone stopped smoking was the same overall as it was for people who used the nicotine patch.) Because the probabilities in parts a and b do not match, the events are dependent.

d. These events are not mutually exclusive because they can happen at the same time. P(stopping smoking and nicotine patch) = $\frac{57}{610}$.
If these were mutually exclusive events, this probability would be 0.

e. $\frac{320}{610} + \frac{122}{610} = \frac{442}{610} = 0.725$ These are mutually exclusive events because P(patch and inhaler) = 0
(No one used both methods)

f. These are not mutually exclusive events.
$\frac{143}{610} + \frac{320}{610} - \frac{57}{610} = \frac{406}{610} = 0.666$

g. $\frac{467}{610} \cdot \frac{466}{609} = 0.586$

prob. the first continued smoking

prob. a second person continued smoking

8. No, probabilities can't be negative

9.

x	P(x)	xP(x)	x−μ	(x−μ)²	(x−μ)² P(x)
10	0.20	2	−13	169	33.8
20	0.30	6	−3	9	2.7
30	0.50	15	7	49	24.5
		μ = 23 ← mean			σ² = 61 ← variance

σ = $\sqrt{61}$ = 7.8 ← standard deviation

10. a discrete

b.

x	0	1	2	3	4
P(x)	0.2401	0.4116	0.2646	0.0756	0.0081

c. $P(X=2) = \frac{4!}{2!(4-2)!}(0.30)^2(0.70)^{4-2} = 0.2646$

d. $P(X \le 2) = 0.2401 + 0.4116 + 0.2646 = 0.9163$

e. $\mu = np = 4(0.30) = 1.2$

f. $\sigma = \sqrt{npq} = \sqrt{4(0.30)(0.70)} = 0.9$

11.

	x	P(X=x)	x · P(X=x)
major	9900	1/2000 = 0.0005	4.95
minor	2900	1/500 = 0.002	5.8
neither	−100	0.9975	−99.75
			μ = −89

Note that the probabilities must add to 1.

12.

x	$P(X=x)$	$x \cdot P(X=x)$
3	0.07	0.21
2	0.11	0.22
1	0.21	0.21
0	0.61	0

$\mu = 0.64$

13.

X = profit

	X	$P(X=x)$	$x \cdot P(X=x)$
win	30,000	0.20	6000
loses	-12,000	0.80	-9600

$\mu = -3600$

14.

X = profit

X	$P(X=x)$	$x \cdot P(X=x)$
498	$1/2000$	0.249
98	$1/2000$	0.049
8	$10/2000$	0.04
-2	$\frac{1988}{2000}$	-1.988

$\mu = -1.65$