

East Los Angeles College
Department of Mathematics
Math 227MW
Test 2

Solutions

Standard Deck- Assume the Ace is low. If you select a card at random, what's the probability of selecting the following:

1. Queen?
2. Heart?
3. Red Heart?
4. Red Queen?
5. Queen of Hearts?
6. Queen or Heart?
7. Queen or King?
8. Queen given that the card is a Heart?
9. Queen given that the card is a non-Heart?

Roulette

If you spin a wheel with roulette, what's the probability the ball lands on:

10. 7 or 11
11. Number more than 20?

If you bet \$ 2.00 on the ball landing on 7 or 11 or 13 for a chance to win \$ 50, compute the:

- 12 Probability of winning?
13. Probability of losing?
14. The amount you would lose, if you ball did not land on 7 or 11 or 13?
15. The amount you would win, if the ball lands on 7 or 11 or 13?
16. The expected value for this game.

Pets Based on Gender

The following table illustrates the relationship of Pets to gender based on a survey of college students.

Approximate your answer to the nearest thousandths

	Dog	Cat	Bird	Other	None	Total
Male	62	22	18	38	113	253
Female	27	55	10	21	92	205
Total	89	77	28	59	205	458

If you select from this table, what's the probability of selecting a:

Approximate your answer to the nearest Thousandths.

17. Male?
18. Dog?
19. Pet?

20. Dog or a Cat?
21. Dog given that the person is a male?
22. Cat given that the person is a female?
23. Pet given that the person is a male?

Six Children

Let x represent the number of boys a couple has when having six children. The following table illustrates the probability distribution associated with having boys.

x	$p(x)$
0	0.0156
1	0.0938
2	0.234
3	0.312
4	0.234
5	0.0938
6	0.0156

If you select a person at random, what's the probability the person has:

24. No boys?
25. One boy?
26. At least one boy?
27. No more than one boy?
28. More than two boys?
29. No More than two boys?
30. What is the expected number of boys? **Approximated to the nearest hundredths**
31. What is the variance? **Approximated to the nearest hundredths**
32. What is the standard deviation? **Approximated to the nearest hundredths**

Answer Sheet

1		$\frac{1}{13}$	✓	17		0.552	✓
2		$\frac{1}{4}$	✓	18		0.194	✓
3		$\frac{1}{4}$	✓	19		0.552	✓
4		$\frac{1}{26}$	✓	20		0.362	✓
5		$\frac{1}{52}$	✓	21		0.245	✓
6		$\frac{4}{13}$	✓	22		0.268	✓
7		$\frac{2}{13}$	✓	23		0.553	✓
8		$\frac{1}{13}$	✓	24		0.0156	✓
9		$\frac{1}{13}$	✓	25		0.0938	✓
10		$\frac{1}{19}$	✓	26		0.9844	✓
11		$\frac{0}{19}$	✓	27		0.1094	✓
12		$\frac{3}{38}$	✓	28		0.6566	✓
13		$\frac{35}{38}$	✓	29		0.3434	✓
14	\$	- 2.00	✓	30		3.00	✓
15	\$	48	✓	31		1.49	✓
16		\$ 1.45	✓	32		1.22	✓

32✓

$$(1) P(Q) = \frac{n(Q)}{n(S)}$$

$$= \frac{4}{52}$$

$$= \boxed{\frac{1}{13}}$$

$$(2) P(H) = \frac{n(H)}{n(S)}$$

$$= \frac{13}{52}$$

$$= \boxed{\frac{1}{4}}$$

$$(3) P(\text{Red } H) = \frac{n(\text{Red } H)}{n(S)}$$

$$= \frac{13}{52} = \boxed{\frac{1}{4}}$$

$$(4) P(\text{Red } Q)$$

$$= \frac{n(\text{Red } Q)}{n(S)}$$

$$= \frac{2}{52}$$

$$= \boxed{\frac{1}{26}}$$

$$(5) P(Q \text{ and } H)$$

$$= P(Q \text{ and } H)$$

$$= \frac{n(Q \text{ and } H)}{n(S)}$$

$$= \boxed{\frac{1}{52}}$$

$$(6) P(Q \text{ or } H)$$

$$= P(Q) + P(H) - P(Q \text{ and } H)$$

$$= \frac{4}{52} + \frac{13}{52} - \frac{1}{52}$$

$$= \frac{16}{52} = \frac{8}{26} = \boxed{\frac{4}{13}}$$

$$(7) P(Q \text{ or } K) = P(Q) + P(K) - P(Q \text{ and } K)$$

$$= \frac{4}{52} + \frac{4}{52} - \frac{0}{52}$$

$$= \frac{8}{52} = \frac{4}{26} = \boxed{\frac{2}{13}}$$

$$(8) \quad p(\theta | H) = \frac{n(\theta \text{ and } H)}{n(H)}$$

$$= \left[\frac{1}{13} \right]$$

$$(9) \quad p(\theta | \text{non } H) = \frac{n(\theta \text{ and non } H)}{n(\text{non } H)}$$

$$= \frac{3}{39}$$

$$= \left[\frac{1}{13} \right]$$

$$(10) \quad S = \{0, 00, 1, 2, \dots, 3.6\} \quad ; \quad n(S) = 38$$

$$p(7 \text{ or } 11) = p(7) + p(11) - p(7 \text{ and } 11)$$

$$= \frac{1}{38} + \frac{1}{38} - \frac{0}{38}$$

$$= \frac{2}{38} = \left[\frac{1}{19} \right]$$

$$(11) \quad \text{number} > 20$$

$$p(\text{number} > 20) = \frac{n(\text{number} > 20)}{n(S)}$$

$$= \frac{16}{38} = \left[\frac{8}{19} \right]$$

$$\begin{aligned}
 (12) \quad p(\text{7 or 11 or 13}) &= p(7) + p(11) + p(13) \\
 &= \frac{1}{38} + \frac{1}{38} + \frac{1}{38} \\
 &= \left| \frac{3}{38} \right|
 \end{aligned}$$

$$\begin{aligned}
 (13) \quad p(\text{lose}) &= 1 - p(\text{win}) \\
 &= 1 - \frac{3}{38} = \frac{38}{38} - \frac{3}{38} = \left| \frac{35}{38} \right|
 \end{aligned}$$

$$(14) \quad -2.00 \quad (15) \quad \text{net } \$50 - \$2 = \left| \$48 \right|$$

X	P(X)	X P(X)
outcomes	probability	
46 win	$\frac{3}{38}$	$46 \cdot \frac{3}{38}$
-2 lose	$\frac{35}{38}$	$-2 \cdot \frac{35}{38}$

$$\mu = \frac{144}{38} - \frac{70}{38} ; \mu = \frac{74}{38} ; \left| \mu \approx \$1.95 \right|$$

$$\begin{aligned}
 (17) \quad p(\text{male}) &= \frac{n(\text{male})}{n(S)} \\
 &= \frac{253}{458} \approx \left| 0.552 \right|
 \end{aligned}$$

$$\begin{aligned}
 (18) \quad p(\text{Dog}) &= \frac{n(\text{Dog})}{n(S)} \\
 &= \frac{89}{458} \approx \left| 0.194 \right|
 \end{aligned}$$

$$(19) p(\text{Pet}) = \frac{n(\text{Pet})}{n(S)}$$

$$= \frac{89 + 77 + 28 + 59}{458}$$

$$= \frac{253}{458} \approx \underline{0.552}$$

$$(20) p(\text{Dog or cat}) = p(\text{Dog}) + p(\text{cat}) - p(\text{both})$$

$$= \frac{89}{458} + \frac{77}{458} - \frac{0}{458}$$

$$= \frac{89 + 77 - 0}{458} = \frac{166}{458}$$

$$\approx \underline{0.362}$$

$$(21) p(\text{Dog} | \text{male}) = \frac{n(\text{Dog and male})}{n(\text{male})}$$

$$= \frac{62}{253} \approx \underline{0.245}$$

$$(22) p(\text{cat} | \text{female}) = \frac{n(\text{cat and female})}{n(\text{female})}$$

$$= \frac{55}{205} \approx \underline{0.268}$$

$$(23) p(\text{pet} | \text{male}) = \frac{n(\text{pet and male})}{n(\text{male})}$$

$$= \frac{62 + 22 + 18 + 38}{253} = \frac{140}{253} \approx \underline{0.553}$$

$$(24) \quad x=0 ; \quad \boxed{p(0) = 0.0156}$$

$$(25) \quad x=1 ; \quad \boxed{p(1) = 0.0938}$$

$$(26) \quad x \geq 1 ; \quad p(x \geq 1) = 1 - p(0)$$

$$= 1 - 0.0156$$

$$= \boxed{0.9844}$$

$$(27) \quad x \leq 1 ; \quad p(x \leq 1) = p(0) + p(1)$$

$$= 0.0156 + 0.0938$$

$$= \boxed{0.1094}$$

$$(28) \quad x > 2 ; \quad p(x > 2) = p(3) + p(4) + p(5) + p(6)$$

$$= 1 - p(0) - p(1) - p(2)$$

$$= 1 - 0.0156 - 0.0938$$

$$- 0.234$$

$$= \boxed{0.6566}$$

$$(29) \quad x \leq 2 ; \quad p(x \leq 2) = p(0) + p(1) + p(2)$$

$$= 0.0156 + 0.0938 + 0.234$$

$$= \boxed{0.3434}$$

$$(30) \quad \mu = \sum_{\text{all } x} x p(x)$$

See table ; $\mu \approx 3.00$

$$(31) \quad \sigma^2 = \sum_{\text{all } x} x^2 p(x) - \mu^2$$

$$= 10.4884 - 3^2$$

$$\approx 1.49 ; \quad \underline{\underline{\sigma^2 \approx 1.49}}$$

$$(32) \quad \sigma = \sqrt{\sigma^2} ; \quad \sigma = \sqrt{1.49}$$

$$\underline{\underline{\sigma \approx 1.22}}$$

x	p(x)	xp(x)	x ² p(x)
0	0.0156	0	0
1	0.0938	0.0938	0.0938
2	0.234	0.468	0.936
3	0.312	0.936	2.808
4	0.234	0.936	3.744
5	0.0938	0.469	2.345
6	0.0156	0.0936	0.5616

Sum

0.9988

2.9964

10.4884