East Los Angeles College
Department of Mathematics
Math 227TTh
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?

Roulette

You spin a roulette wheel. If you bet $ 2.00 on the ball landing on 7 or 11 or 13 for a chance to win $ 50, compute the:

9 Probability of winning?
10. Probability of losing?
11. The amount you would lose, if you ball did not land on 7 or 11 or 13?
12. The amount you would win, if the ball lands on 7 or 11 or 13?
13. 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.

14. Male?
15. Dog?
16. Pet?
17. Dog or a Cat?
18. Cat given that the person is a female?
19. 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:

20. No boys?
21. One boy?
22. At least one boy?
23. No more than one boy?
24. More than two boys?
25. No more than two boys?
26. What is the expected number of boys? **Approximated to the nearest hundredths**

Political Preference for a Town

45% of a Town are Democrats, while 55% are not Democrats.

If you select a group of 9 students at random, what's the probability that:

Approximate your answers to the nearest thousandths

27. None are democrats?
28. One is a democrat?
29. More than one are democrats?
30. No more than two are democrats?
31. What is the expected number of democrats?
32. What is the standard deviation for this distribution?

Answer Sheet

1	$\frac{1}{13}$	17	0.362
2	$\frac{1}{4}$	18	0.268
3	$\frac{1}{4}$	19	0.553
4	$\frac{1}{26}$	20	0.0156
5	$\frac{1}{52}$	21	0.0938
6	$\frac{4}{13}$	22	0.9844
7	$\frac{2}{13}$	23	0.1094
8	$\frac{1}{13}$	24	0.6566
9	$\frac{3}{38}$	25	0.3434
10	$\frac{35}{38}$	26	3.00
11	$ -2.00	27	0.005
12	$ 49.00	28	0.023
13	$ 1.95	29	0.972
14	0.552	30	0.139
15	0.194	31	4.05
16	0.552	32	1.49

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

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

④ $P(\text{Red Q}) = \frac{n(\text{Red Q})}{n(S)}$

$= \frac{2}{52}$

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

⑤ $P(Q \text{ of } H) = \frac{n(Q \text{ of } H)}{n(S)}$

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

⑥ $P(Q \text{ or } H) = P(Q) + P(H) - P(\text{Roth})$

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

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

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

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

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

(8) $P(Q|H) = \frac{n(Q \text{ and } H)}{n(H)}$

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

(9) $P(\text{win}) = P(7 \text{ or } 11 \text{ or } 13)$

$= P(7) + P(11) + P(13)$

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

$= \boxed{\frac{3}{38}}$

(10) $P(\text{lose}) = 1 - P(\text{win})$

$= 1 - \frac{3}{38} = \frac{38}{38} - \frac{3}{38} = \boxed{\frac{35}{38}}$

(11) $\boxed{-2.00}$ (12) net $50 - 2 = \boxed{\$48}$

(13)

x	p(x)	xp(x)
Outcome	Probability	
48 win	3/38	$48 \cdot \frac{3}{38}$
-2 lose	35/38	$-2 \cdot \frac{35}{38}$

$$\mu = 48 \cdot \frac{3}{38} + -2 \cdot \frac{35}{38}$$

$$\mu = \frac{144}{38} - \frac{70}{38}, \quad \mu = \frac{74}{38}$$

$$\boxed{\mu \approx 1.95}$$

(14) $$p(m) = \frac{n(m)}{n(s)}$$

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

(15) $$p(D) = \frac{n(D)}{n(s)}$$

$$= \frac{89}{458} \approx \boxed{0.194}$$

(16) $$p(pet) = \frac{n(pet)}{n(s)}$$

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

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

(17) $P(D \text{ or } C) = P(D) + P(C) - P(\text{both})$

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

$$= \frac{166}{458} \approx \boxed{0.362}$$

(18) $P(\text{cat} \mid f) = \frac{n(\text{cat and } f)}{n(f)}$

$$= \frac{55}{205}$$

$$\approx \boxed{0.268}$$

(19) $P(\text{pet} \mid m) = \frac{n(\text{pet and } m)}{n(m)}$

$$= \frac{62+22+18+88}{253}$$

$$= \frac{140}{253} \approx \boxed{0.553}$$

(20) $x = 0$; $\boxed{P(0) = 0.0156}$

(21) $x = 1$; $\boxed{P(1) = 0.0938}$

(22) $x \geq 1$; $P(x \geq 1) = 1 - P(0)$

$$= 1 - 0.0156$$
$$= \boxed{0.9844}$$

(23) $x \leq 1$; $p(x \leq 1) = p(0 \text{ or } 1)$

$= p(0) + p(1) - p(\text{both})$

$= 0.0156 + 0.0938 - 0$

$= \boxed{0.1094}$

(24) $x > 2$; $p(x > 2) = p(3) + p(4) + p(5) + p(6)$

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

$= 1 - 0.0156 - 0.0938 - 0.234$

$= \boxed{0.6566}$

(25) $x \leq 2$; $p(x \leq 2) = p(0 \text{ or } 1 \text{ or } 2)$

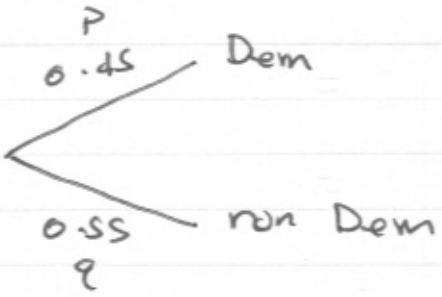
$= p(0) + p(1) + p(2)$

$= 0.0156 + 0.0938 + 0.234$

$= \boxed{0.3434}$

(26) $\mu = \underset{\text{all } x}{\Sigma} x\,p(x)$; $\boxed{\mu = 3.00}$ See table

$$P(x) = {}_nC_x \, p^x q^{n-x}$$



x = # of democrats

$p = 0.45$; $n = 9$

$q = 0.55$

(27) $x = 0$; $P(0) = {}_9C_0 \, 0.45^0 \, 0.55^{9-0}$

$= {}_9C_0 \cdot 1 \cdot 0.55^9$

$= 1 \cdot 1 \cdot 0.55^9$

$= 0.55^9 \approx \boxed{0.005}$

(28) $x = 1$; $P(1) = {}_9C_1 \, 0.45^1 \, 0.55^{9-1}$

$= 9 \cdot 0.45 \cdot 0.55^8$

$\approx \boxed{0.023}$

(29) $x > 1$; $P(x > 1) = P(2 \text{ or } 3 \text{ or } \dots \text{ or } 9)$

$= P(2) + P(3) + \dots + P(9)$

$= 1 - P(0) - P(1)$

$= 1 - 0.005 - 0.023$

$\approx \boxed{0.972}$

(30) $x \leq 2$; $p(x \leq 2) = p(0 \text{ or } 1 \text{ or } 2)$

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

$= 0.005 + 0.023 +$ $p(2)$

note : $p(2) = {}^{9}C_2\, 0.45^2\, 0.55^{9-2}$

$= 36 \cdot 0.45^2\, 0.55^7$

$\approx \boxed{0.111}$

ie, $p(x \leq 2) = 0.005 + 0.023 + 0.111$

$= \boxed{0.139}$

(31) $\mu = np$; $\mu = 9 \cdot 0.45$

$\boxed{\mu = 4.05}$

(32) $\sigma = \sqrt{npq}$

$\sigma = \sqrt{9 \cdot 0.45 \cdot 0.55}$

$\boxed{\sigma \approx 1.49}$

x	p(x)	xp(x)
0	0.0156	0
1	0.0938	0.0938
2	0.234	0.468
3	0.312	0.936
4	0.234	0.936
5	0.0938	0.469
6	0.0156	0.0936
Sum	0.9988	2.9964