

Total 12 points

Please show all your work.

1. (6 pts) 25% of adults say they own a dog. You randomly select 7 adults and ask them if they own a dog. Find the probability that the number of dog owners is

a) exactly 3  ${}^7C_3 \times .25^3 \times .75^4 = 35 \times .25^3 \times .75^4 = .173$

Answer 17.3%

b) at least 6

$${}^7C_6 \times .25^6 \times .75 + {}^7C_7 \times .25^7 = 0.00138 + 0.00006 = 0.00134$$

Answer 0.134%

2. (6 pts) The number of dogs per household in a small town is given. Construct a probability distribution and then find the mean and standard deviation of the probability distribution.

Dogs	Households	P(x)	x - M	(x - M) <sup>2</sup>
0	1490	69%	-0.46	.2116
1	425	20%	0.54	.2916
2	168	8%	1.54	2.3716
3	48	2%	2.54	6.4516
4	19	1%	3.54	12.5316
	<u>2150</u>			

$M = 0.46$

$M = \sum x P(x)$

$\sigma = \sqrt{\sum P(x)(x-M)^2} = \sqrt{0.648} = .80$

mean 0.46  
 standard deviation 0.80

Name KEY

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1. (6 pts) The probability that a random flight leaves on time is 0.90. There are 5 planes at Terminal B. Let  $x$  represent the number of flights that leave on time.

a) Find the probability that 3 flights will leave on time.

$$5C_3 \times 0.9^3 \times 0.1^2 = 10 \times 0.9^3 \times 0.1^2 \\ = 0.0729 = 7.29\%$$

b) Find the probability that at least 4 flights will leave on time.

$$5C_4 \times 0.9^4 \times 0.1 + 5C_5 \times 0.9^5 = .92$$

2. (6 pts) The number of people in each household in a small town is given. Construct a probability distribution and then find the mean and the standard deviation.

People	1	2	3	4	5	6	7	
Households	223	315	280	241	121	54	8	1242
$P(x)$	.180	.254	.225	.194	.097	.043	.006	
$(x-M)$	-1.9	-.9	.1	1.1	2.1	3.1	4.1	
$(x-M)^2$	3.61	.81	.01	1.21	4.41	9.61	16.81	

$$M = \sum xP(x) = 2.924 \approx 2.9$$

$$\sigma = \sqrt{\sum (x-M)^2 P(x)} = \sqrt{2.03} \approx 1.4$$

Mean 2.9Standard deviation 1.4