Use the table below to answer questions 1-10. It shows the distribution for the number of pets in a household in San Francisco.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| X | 0 | 1 | 2 | 3 | 4 |
| P(X) | 0.341 | 0.309 | 0.267 | 0.062 | 0.021 |

**Use this sheet or write answers on a separate sheet. Show steps in your calculations, if you did them. For example, P(0 or 1) = 0.341 + 0.309 = 0.650.**

1. If we were to randomly select a household in San Francisco, what is the probability that the house has one pet?
2. What is the likelihood that a household in San Francisco has more than three pets?
3. What is the probability that a household in San Francisco has one or two pets?
4. What is the probability that a San Francisco household has at least two pets?

5. What is likelihood that a San Francisco household has three pets or less?

6. What is the probability that a San Francisco household has at least one pet?

7. What is the probability that a San Francisco household has at most three pets?

8. If we randomly selected 2000 San Francisco households, about how many would you expect to have exactly 2 pets?

9. What is the expected number of pets per San Francisco household?

10. What is the standard deviation of the probability distribution?

11. A building contractor pays $250 to bid on a contract. If he gets the contract, the probability of which is 0.2, he will make $10,000 on the job (net). On the other hand, if he does not get the contract, he loses the $250 he paid to bid. Find the contractor’s expected net profit on a bid. Interpret the result. **(Hint:** try starting by writing out a probability distribution like in the previous 10 problems!)

12. According to the Social Security Administration Period Life table, the probability a 70-year-old male will die in the next year is about 0.018. The cost of a $10,000 life insurance policy for a 70-year-old male from one company is about $540 per year. John is a 70-year-old man. He pays $540 at the beginning of the year for a $10,000 life insurance policy.

a) If John dies this year, will the insurance company make money or lose money on his policy *this* year?

b) How much money will the company make or lose?

c) What is the probability John will die during the year?

d) If John lives for the entire year will the company make money or have to

pay money?

e)How much money will the company make or lose?

f)What is the probability John lives during the year?

g)Let represent the amount of money that the insurance company earns *this* year from this man’s policy. When the company loses money the amount of money earned is negative. Construct a probability distribution for  by completing the table below:

|  |  |  |
| --- | --- | --- |
| Amount of Money Earned by the Insurance Company |   |   |
| Probability, P(x) |   |   |

h)What is the expected value of the amount of money that the insurance company will earn this year on this policy?

i) Interpret the expected value of the random variable.

13. We previously looked at this example, but I want to examine it in a different way:

The table below is based on a 1988 study of accident records conducted by the Florida State Department of Highway Safety.



**Question:** *Does wearing a seat belt lower the risk of an accident resulting in a fatality?*

a. Is there an association between wearing a seatbelt and being in an accident resulting in a fatality?

b. Use one of the probabilities you looked at in part a to verify the formula: 

c. If two events are ***independent***, then the following are true:



And



Are “wearing a seatbelt” and “being in an accident involving a fatality” independent of each other?

14. Write down the notation that is new to us today, with a sentence to remind you of what it represents.