The total annual cost of fire in the United States is about 2.5% of the domestic gross product.

EXAMPLE 2 Find an Expected Value

You take out a fire insurance policy on your home. The annual premium is $300. In case of fire, the insurance company will pay you $200,000. The probability of a house fire in your area is 0.0002.

a. What is the expected value?

b. What is the insurance company's expected value?

c. Suppose the insurance company sells 100,000 of these policies. What can the company expect to earn?

SOLUTION

a. Expected value $= (0.0002)(199{,}700) + (0.9998)(-300) = -\$260.00$

$200{,}000 - 300$ (Fire) (No Fire)

The expected value over many years is $-\$260$ per year. Of course, your hope is that you will never have to collect on fire insurance for your home.

b. The expected value for the insurance company is the same, except the perspective is switched. Instead of $-\$260$ per year, it is $+\$260$ per year. Of this, the company must pay a large percent for salaries and overhead.

c. The insurance company can expect to gross $30,000,000 in premiums on 100,000 such policies. With a probability of 0.0002 for fire, the company can expect to pay on about 20 fires. This leaves a gross profit of $26,000,000.

Checkpoint

Help at Math.andYOU.com

In the circle graph, why is the percent for property damage greater than the percent for fire insurance premiums?