Aircraft Accidents. ***In Exercises 5–8, assume that the Poisson distribution applies, assume that the mean number of aircraft accidents in the United States is 8.5 per month (based on data from the National Transportation and Safety Board), and proceed to find the indicated probability.***

5. Find $P(0)$, the probability that in a month, there will be no aircraft accidents. Is it unlikely to have a month with no aircraft accidents?

6. Find $P(6)$, the probability that in a month, there will be 6 aircraft accidents. Is it unlikely to have a month with exactly 6 aircraft accidents?

7. Find $P(10)$, the probability that in a month, there will be 10 aircraft accidents. Is it unlikely to have a month with exactly 10 aircraft accidents?

8. Find $P(12)$, the probability that in a month, there will be 12 aircraft accidents. Is it unlikely to have a month with exactly 12 aircraft accidents?

In Exercises 9–16, use the Poisson distribution to find the indicated probabilities.

9. Earthquakes in the United States Various sources provide different earthquake data, but assume that for a recent 41-year period in the United States, there were 268 earthquakes measured at 6.0 or higher on the Richter scale (based on U.S. Geological Survey data).

a. Find the mean number of earthquakes per year.

b. Find the probability that in a given year, there is at least one earthquake in the United States that measures 6.0 or higher on the Richter scale.

c. Is it unlikely to have a year without any earthquakes that measure 6.0 or higher on the Richter scale? Why or why not?

10. Earthquakes in the World Various sources provide different earthquake data, but assume that for a recent 41-year period in the world, there were 5469 earthquakes measured at 6.0 or higher on the Richter scale (based on U.S. Geological Survey data).

a. Find the mean number of earthquakes per year.

b. Find the probability that in a given year, there are exactly 133 earthquakes that measures 6.0 or higher on the Richter scale.

c. If, in a particular year, there are exactly 133 earthquakes that measure 6.0 or higher on the Richter scale, would it make sense to report that this is a year with an unusual number of earthquakes? Why or why not?

11. Radioactive Decay Radioactive atoms are unstable because they have too much energy. When they release their extra energy, they are said to decay. When studying cesium-137, a nuclear engineer found that over 365 days, 1,000,000 radioactive atoms decayed to 977,287 radioactive atoms, so 22,713 atoms decayed during 365 days.

a. Find the mean number of radioactive atoms that decayed in a day.

b. Find the probability that on a given day, 50 radioactive atoms decayed.

12. Deaths from Horse Kicks A classical example of the Poisson distribution involves the number of deaths caused by horse kicks to men in the Prussian Army between 1875 and 1894. Data for 14 corps were combined for the 20-year period, and the 280 corps-years included a total of 196 deaths. After finding the mean number of deaths per corps-year, find the probability that a randomly selected corps-year has the following numbers of deaths: (**a**) 0, (**b**) 1, (**c**) 2, (**d**) 3, (**e**) 4.

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