9.8. Friday, Saturday, and Sunday are 3 days of a 7-day week. Note that

$$\frac{3}{7} \approx 0.429 \quad \text{(or, about 43\%)}.$$

Therefore, it is not surprising that 42% of the fatalities would occur on these 3 days over the long run. This writer merely wrote what should be obvious.

9.11. Take the number of deer and divide it by the number of square miles:

$$\frac{800,000}{438} \approx 1,826 \text{ deer per square mile.}$$

There are 640 acres in a square mile, so the number of deer per acre would be

$$\frac{1,826}{640} \approx 2.9 \quad \text{or about 3 deer per acre.}$$

This figure is highly unlikely even in the most remote wilderness parts of the United States (we can perhaps find clusters of regions with an abundance of deer, but probably not this many consistently across a large region). It is certainly implausible in a suburban area like Westchester County.

9.20. Let's calculate the percentage change in the number of poverty cases (a count) between 1997 and 2017:

$$\begin{aligned}
\text{percentage change} &= \frac{\text{amount of the change}}{\text{starting value}} \times 100\% \\
&= \frac{39{,}698{,}000 - 35{,}574{,}000}{35{,}574{,}000} \times 100\% \\
&= \frac{4{,}124{,}000}{35{,}574{,}000} \times 100\% \\
&= 0.116 \times 100\% \\
&= 11.6\%.
\end{aligned}$$

The **percentage increase** in number of people living in poverty between 1997 and 2017 was 11.6%. This sounds large, but is it valid? The population of the US grew substantially during this 20-year period! Using US Census Bureau data, here were the population sizes of the US in 1997 and 2017:

- 1997: 272,900,000
- 2017: 325,100,000.

Because the population sizes were so different, using the number of poverty cases (a count) is not a valid way to measure the amount of poverty. A more valid way is to compare the proportion of poverty cases in the two years:

$$\begin{aligned}
1997: &\quad \frac{35,574,000}{272,900,000} \approx 0.130 \quad \text{(or about 13.0\%)} \\
2017: &\quad \frac{39,698,000}{325,100,000} \approx 0.122 \quad \text{(or about 12.2\%)}.
\end{aligned}$$

Therefore, the proportion of Americans living in poverty actually decreased over this 20-year period.

9.21. It is not possible to reduce something by more than 100%. Once you remove 100% of something, there is nothing left.

Comment: In this application, removing 100% of the CO_2 emissions means there is no CO_2 being emitted. Climate scientists may be thinking about emitting no new CO_2, and, on top of this, removing existing CO_2 already in the atmosphere. For this special case, I can see how a percentage decrease of more than 100% is a targeted goal−emit no CO_2 (a 100% percent reduction) and then remove existing CO_2 in addition to this. However, this was not conveyed clearly in the excerpt given in the question.

9.22. At least biologically at birth, we should first concede the population of humans is roughly 50% males and 50% females in the US and Great Britain (and probably in most places). Therefore, if the female figures are correct, then where are all the females the males are "partnering with" to attain the higher male figures? It is not possible mathematically to have such a large disparity in the number of heterosexual partners between the two sexes if there is a 50-50 split in the sexes in the population. At least one sex's results must be wrong. In fact, they are probably both wrong. Self-reported data like these are almost always wrong. Knowing what I know about males and females, males probably (way) overestimated theirs and females probably underestimated theirs.

9.23. First of all, whoever wrote the excerpt does not know what the word "odds" means. Odds is not the same as chance, proportion, or probability. It is certainly NOT true that 1 out of every 103 Americans dies in a motor vehicle crash in a given year, yet this is how it sounds in the excerpt. It could be that 1 out of every 103 deaths in the US in 2019 was from a motor vehicle crash; in fact, this is plausible and probably what the author meant to say. However, s/he didn't say that exactly, and s/he is misusing the word "odds." The chance a typical American died in a motor vehicle crash in 2019 (assuming each American was equally likely to do so) was

$$\frac{48,000}{327,000,000} \approx 0.00015.$$

This is roughly 1.5 motor vehicle deaths per 10,000 Americans. This number is a lot smaller than "1 out of 103."