Exercise 11

The problem says to test the hypotheses, so we should show all 7 steps.

1. Let p be the probability that Alfredo guesses a picture correctly.
$$H_0: \quad p = 0.20$$
$$H_1: \quad p > 0.20$$

2. $\alpha = 0.01$.

3. $z = \dfrac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$.

4. We have $n = 50$, $\hat{p} = \frac{36}{50} = 0.72$, and $p_0 = 0.50$. The test statistic is

$$
\begin{aligned}
z &= \frac{0.72 - 0.20}{\sqrt{\frac{(0.20)(0.80)}{50}}} \\
&= \frac{0.52}{0.0565} \\
&= 9.192.
\end{aligned}
$$

5. p-value = `normalcdf(3.111,E99)` $= 1.951 \times 10^{-20}$.

6. Reject H_0.

7. Alfredo is able to guess more than 20% of the pictures correctly. (Whether he has ESP or is cheating is beyond the scope of statistics to say.)