According to a study by Tufts University, 48.3% of U.S. college students voted in the 2016 General Election. A political science researcher wonders if the college student voter turnout is higher this year. She takes a random sample of 455 college students after the 2020 election and finds that 247 voted. Test the researcher's hypothesis at the $\alpha = 0.01$ level.

1. Define the population parameter and state the null and alternative hypotheses.

   Let $p =$ the true proportion of college students who voted in the 2020 Election.

   $H_0 : p = 0.483$ $H_1 : p > 0.483$

2. State and verify the necessary **conditions** for the hypothesis test.

   (1) The data come from a random sample — stated in the problem.
   (2) It can be reasonably assumed that 455 is less than 5% of all U.S. college students.
   (3) $np_0(1 - p_0) = 455(0.483)(1 - 0.483) = 113.62 \geq 10$

3. Compute the **test statistic**.

   $$z_0 = \frac{\frac{247}{455} - 0.483}{\sqrt{\frac{(.483)(1-.483)}{455}}} = 2.56$$

4. Find the **p-value**.

   p-value $= P(Z > 2.56) = 1 - P(Z < 2.56) = 1 - 0.9948 = 0.0052$

5. State and justify your **decision** about the null hypothesis and write your **conclusion** in terms of the alternative hypothesis.

   Reject H_0 since p-value $= 0.0052 < \alpha = 0.01$. At the $\alpha = 0.01$ significance level, we have sufficient evidence that the true proportion of students who voted in the 2020 election is higher than it was in the 2016 election.