

Question #1838 Use the definition of e , and numerical approximations as y approaches 0 from the left, and y approaches 0 from the right.

(b) Use a calculator to estimate the values of the limits given below, correct to two decimal places. $\lim_{y \rightarrow 0} (2.7^y - 1)/y$ and $\lim_{y \rightarrow 0} (2.8^y - 1)/y$ What can you conclude about the value of e ?

Solution. The first question is unclear. For the next use if $a > 0$ then $\lim_{x \rightarrow 0} \frac{a^x - 1}{x} = \ln a$. Hence $\lim_{y \rightarrow 0} (2.7^y - 1)/y = \ln 2.7 \approx 0.99$ and $\lim_{y \rightarrow 0} (2.8^y - 1)/y = \ln 2.8 \approx 1.03$. Hence $2.7 < e < 2.8$.