SAMPLE SOLUTION OF QUIZ 4

Question: Evaluate

$$\lim_{x\to 0} \frac{x^{25} + \ln(x+1)}{e^{3x} - 5^{x}}.$$

Solution:

$$\lim_{x\to 0} \frac{x^{25} + \ln(x+1)}{e^{3x} - 5^{x}} \underset{\substack{\downarrow \\ \text{use} \\ \text{l'Hospital's} \\ \text{rule}}}{\overset{\left[\frac{0}{0}\right]}{=}} \lim_{x\to 0} \frac{25x^{24} + \frac{1}{x+1}}{3e^{3x} - 5^{x}\ln 5}$$

$$= \frac{0+1}{3-\ln 5} \quad \text{since each limit exists}$$

$$= \frac{1}{3-\ln 5}.$$