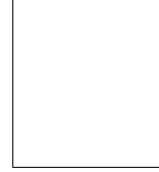




Quiz # 1
Math 101-Section 09 Calculus I
10 October 2018, Friday
Instructor: Ali Sinan Sertöz
Solution Key



Bilkent University

Q-1)

Evaluate $\lim_{x \rightarrow 0} \frac{(27+x)^{1/3} - 3}{\sqrt{25+x} - 5}$ (10 points)

Hint: $(a-b)(a^2+ab+b^2) = a^3 - b^3$.

Solution:

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{(27+x)^{1/3} - 3}{\sqrt{25+x} - 5} &= \lim_{x \rightarrow 0} \frac{(27+x)^{1/3} - 3}{\sqrt{25+x} - 5} \cdot \frac{(27+x)^{2/3} + 3(27+x)^{1/3} + 9}{(27+x)^{2/3} + 3(27+x)^{1/3} + 9} \cdot \frac{\sqrt{25+x} + 5}{\sqrt{25+x} + 5} \\ &= \lim_{x \rightarrow 0} \frac{(27+x) - 27}{(25+x) - 25} \cdot \frac{\sqrt{25+x} + 5}{(27+x)^{2/3} + 3(27+x)^{1/3} + 9} \\ &= \lim_{x \rightarrow 0} \frac{x}{x} \cdot \frac{\sqrt{25+x} + 5}{(27+x)^{2/3} + 3(27+x)^{1/3} + 9} \\ &= \lim_{x \rightarrow 0} \frac{\sqrt{25+x} + 5}{(27+x)^{2/3} + 3(27+x)^{1/3} + 9} \\ &= \frac{10}{27}. \end{aligned}$$