Quiz # 1
Math 101-Section **09** Calculus I
10 October 2018, Friday
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Solution Key

Bilkent University

Q-1)

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

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

Solution:

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