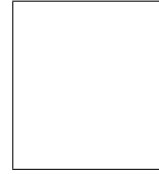Quiz # 2
Math 101-Section **09** Calculus I
19 October 2018, Friday
Instructor: Ali Sinan Sertöz
Solution Key

Bilkent University

Q-1)

(a) If $f(x) = \sin(\cos x^2)$, find $f'(x)$. *(2 points)*

(b) If $f(x) = (\tan x^3)^2$, find $f'(x)$. *(2 points)*

(c) Find, without using L'Hospital's rule, $\displaystyle\lim_{x \to -1} \frac{1 - \cos(x+1)}{x^3 + x^2 - x - 1}$. *(6 points)*

Solution:

(a) $f'(x) = (\cos(\cos x^2))(-\sin x^2)(2x)$.

(b) $f'(x) = 2(\tan x^3)(\sec^2 x^3)(3x^2)$.

(c)

$$
\begin{aligned}
\lim_{x \to -1} \frac{1 - \cos(x+1)}{x^3 + x^2 - x - 1} &= \lim_{x \to -1} \frac{1 - \cos(x+1)}{(x+1)^2(x-1)} \\
&= \lim_{x \to -1} \frac{1 - \cos(x+1)}{(x+1)^2} \lim_{x \to -1} \frac{1}{x-1} \\
&= \frac{1}{2} \frac{1}{-2} \\
&= -\frac{1}{4}.
\end{aligned}
$$