



Quiz # 2
Math 101-Section 13 Calculus I
18 October 2018, Thursday
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Solution Key



Bilkent University

Q-1)

(a) If $f(x) = x^2 \sin x^5$, find $f'(x)$. (2 points)

(b) If $f(x) = (x^3 + x^2 + x + 7)^4$, find $f'(x)$. (2 points)

(c) Find, without using L'Hospital's rule, $\lim_{x \rightarrow -2} \frac{\sin(x+2)}{x^3 + 2x^2 + x + 2}$. (6 points)

Solution:

(a) $f'(x) = (2x)(\sin x^5) + (x^2)(\cos x^5)(5x^4) = 2x \sin x^5 + 5x^6 \cos x^5$.

(b) $f'(x) = 4(x^3 + x^2 + x + 7)^3(3x^2 + 2x + 1)$.

(c)

$$\begin{aligned} \lim_{x \rightarrow -2} \frac{\sin(x+2)}{x^3 + 2x^2 + x + 2} &= \lim_{x \rightarrow -2} \frac{\sin(x+2)}{(x+2)(x^2+1)} \\ &= \lim_{x \rightarrow -2} \frac{\sin(x+2)}{x+2} \lim_{x \rightarrow -2} \frac{1}{x^2+1} \\ &= 1 \times \frac{1}{5} \\ &= \frac{1}{5}. \end{aligned}$$