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جامعة بيرزيت
BIRZEIT UNIVERSITY

Mathematics Department

Math 1431

Name: [redacted] Number: [redacted] Section: ______

10/10

Quiz: Find the following Limits

(a) $\lim_{t\to3}\frac{1}{3-t} =$ DNE

$\lim_{t\to3^+}\frac{1}{3-t} = \frac{1}{small^+} = \infty$

$\lim_{t\to3^-}\frac{1}{3-t} = \frac{1}{small^-} = -\infty$

(b) $\lim_{x\to\infty}\frac{3e^{2x}}{2e^{2x}-e^{3x}} * \left(\frac{e^{-2x}}{e^{-2x}}\right) = \lim_{x\to\infty}\frac{3}{2-e^{x}} = \left(\lim_{x\to\infty}\frac{3}{2}\right)\left(\lim_{x\to\infty}\frac{1}{-e^{x}}\right)$

$= -\frac{3}{2}\lim_{x\to\infty} e^{-x} = 0$

(c) Let $f(x) = \frac{2x^2+3x-2}{x+2}$.

- Is $f(x)$ continuous at $x=-2$? Justify. No

$\lim_{x\to-2} f(x) = \lim_{x\to-2}\frac{2x^2+3x-2}{x+2} = \lim_{x\to-2}\frac{(x+2)(2x-1)}{(x+2)} = -4-1 = -5$

$f(-2) \to$ DNE

- Is $x=-2$ removable discontinuity? yes

$F(x) = \begin{cases}\frac{2x^2+3x-2}{x+2} & x \neq -2 \\ \lim_{x\to-2} f(x) & x = 2\end{cases}$

$F(x) = \begin{cases}\frac{2x^2+3x-2}{x+2} & x \neq 2 \\ -5 & x = 2\end{cases}$

- Find continuous extension $F(x)$ if possible.

$F(x) = \begin{cases}\frac{2x^2+3x-2}{x+2} & x \neq -2 \\ -5 & x = -2\end{cases}$ $\lim_{x\to-2} F(x) = \lim_{x\to-2}\frac{2x^2+3x-2}{x+2}$

$= \lim_{x\to-2}\frac{(x+2)(2x-1)}{(x+2)} = -5$ $F(-2) = 5$

- $\lim_{x\to\infty} f(x) =$

$= \lim_{x\to\infty}\frac{2x^2+3x-2}{x+2}$

$= \infty$

$\frac{N}{D}$ $N > D$

Then $F(x)$ is cont. at $x = -2$ hence $\lim_{x\to-2} F(x) = F(-2)$