Exam I Review

Math 2413
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14 Feb 2019
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1) $\lim_{x\to 4} \frac{(x+5)^{1/2}-3}{x-4} = \lim_{x\to 4} \frac{x+5-9}{(x-4)\left(\sqrt{x+5}+3\right)} = \lim_{x\to 4} \frac{1}{\sqrt{x+5}+3} = \frac{1}{6}$

2) $\lim_{x\to 0} \frac{x}{x^2-x} = \lim_{x\to 0} \frac{1}{x-1} = -1$

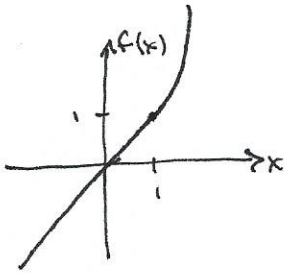
3) $\lim_{x\to 1} \frac{x}{x^2-x} = \lim_{x\to 1} \frac{1}{x-1}$ DNE

4) $\lim_{x\to 3} \frac{x^2-x-6}{x^2-5x+6} = \lim_{x\to 3} \frac{(x-3)(x+2)}{(x-3)(x-2)} = \lim_{x\to 3} \frac{x+2}{x-2} = 5$

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

6) $\lim_{x\to 0} \frac{\frac{1}{x+4}-\frac{1}{4}}{x} = \lim_{x\to 0} \frac{4-x-4}{x(x+4)4} = \lim_{x\to 0} \left(\frac{-1}{4(x+4)}\right) = \frac{-1}{16}$

7) $f(x) = \begin{cases} x & x \le 1 \\ x^2 & x > 1 \end{cases}$



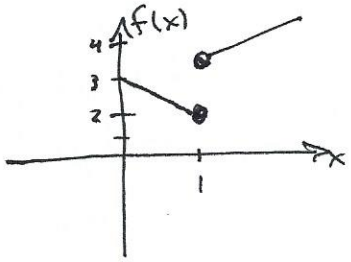
$\lim_{x\to 1^-} f(x) = \lim_{x\to 1^-} x = 1$

$\lim_{x\to 1^+} f(x) = \lim_{x\to 1^+} x^2 = 1$

$f(1) = 1 = \lim_{x\to 1} f(x)$

$\Longrightarrow$ f is continuous

8) $f(x) = \begin{cases} 3-x & x \le 1 \\ 3+\frac{x}{2} & x > 1 \end{cases}$



$\lim_{x\to 1^-} f(x) = 2$

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

$\Longrightarrow$ f not continuous at $x=1$