

EXAM 1 - MATH 151

DUE DATE: Friday, January 30

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Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Consider the functions $f(x) = \frac{x-3}{x+5}$ and $g(x) = \sqrt{x-3}$. Find the domain of f , the domain of g , the formula giving $(g \circ f)(x)$ and the domain of $g \circ f$.
2. Find the value of a and b so that $y = ax + b$ is perpendicular to the line passing through $(-3, 1)$ and $(2, -7)$ and has x -intercept $(40, 0)$.
3. Find (showing all the work needed) the limits

(a) $\lim_{x \rightarrow -3} \frac{x^2 + x - 6}{x^2 + 8x + 15}$

(b) $\lim_{x \rightarrow 0} \frac{\sqrt{x+1}-1}{x}$

(c) $\lim_{x \rightarrow 3} f(x)$, where $f(x) = \begin{cases} \frac{x-3}{x^2-9}, & \text{if } x < 3 \\ x+2, & \text{if } x \geq 3 \end{cases}$

4. Find the following limits showing all the work needed:

(a) $\lim_{x \rightarrow -\infty} \frac{x^2 - 2x + 1}{x - 5}$

(b) $\lim_{x \rightarrow -\infty} \frac{\sqrt{x^2+5}}{2x-11}$

(c) $\lim_{x \rightarrow +\infty} \frac{3x-7}{\sqrt{x^3+8}}$

5. Study with respect to continuity the function

$$f(x) = \begin{cases} \frac{x}{x^2-1}, & \text{if } x < -1 \\ x+1, & \text{if } -1 \leq x \leq 1 \\ 3x^2-1, & \text{if } x > 1 \end{cases}$$

6. Find a value for the constant k , if possible, so that the function f is continuous

everywhere. $f(x) = \begin{cases} kx^2 + 1, & \text{if } x < 2 \\ 3, & \text{if } x = 2 \\ -x + k, & \text{if } x > 2 \end{cases}$