

MATH 231.FA22 TEST 1

Solve the following exercises, concisely explaining all solution steps. Answers without presentation of justification of solution steps are not awarded credit. (45 minutes, 3 course points for each question).

Honor pledge: no external aid, calculators, computers, textbooks or notes allowed.

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Last Name, First Name, PID

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1 Questions

1. State whether the limit

$$\lim_{x \rightarrow 5} \frac{|x - 5|}{x^2 - 25}$$

exists and, if so, compute the limit.

2. Does the equation $x^3 - 5x^2 + 2x = -1$ have a solution in the interval $(-1, 5)$? Explain why or why not. Sketch appropriate plots to give an estimate of the solution.
3. Determine the tangent at $a = -1$ to the graph of

$$f(x) = \frac{2}{3x + 1}.$$

Sketch the graph of $f(x)$ and the tangent line at $a = -1$.

4. Determine the limits at $\pm\infty$ of the function

$$f(x) = \frac{3e^{5x} + 7e^{6x}}{9e^{5x} + 14e^{6x}}.$$

5. Compute the first and second derivative of

$$f(x) = (x^2 + 1) \cos x + (x^2 - 1) \sin x.$$