

Exam #3

Math 121-B

Thursday, November 5, 1998

Put your answers and supporting work on the blank paper, providing me with as much detail as is reasonably possible. Staple the question sheet with your name and signature on top when you turn in the exam. You may answer the questions in any order.

If a graph is relevant to your solution, sketch it, giving the **H-VIEW** and the **V-VIEW** coordinates. If your answer involves a number, round to three digits after the decimal point.

When solving for roots and extrema, do your calculations by hand for full credit. If you can not do your calculations by hand, do them on your calculator for partial credit.

Let $f(x) = \frac{x^2-3}{x+2}$ for Problems #1-4.

1. Find the slant asymptote and the vertical asymptote for $f(x)$.
2. Find the x and y -intercepts for $f(x)$, as well as its domain.
3. Find where $f(x)$ is increasing and decreasing, its extrema, and its range.
4. Find where $f(x)$ is concave up and concave down, and any inflection points.
5. Find the absolute extrema of $f(x) = x^3 - 5x^2 + 3x + 2$ where $-1 \leq x \leq 5$.
6. The area of a triangle is half the product of its base and its height.
Find the smallest possible area for the triangle in the first quadrant formed by the x -axis, the y -axis, and a line segment through the point $(2, 3)$.
7. Explain why an extremum has to be either an endpoint or a critical point.
8. Find and sort (as maximum, minimum, or neither) any critical points of $f(x) = x\sqrt{2x-7}$.
9. Use the second derivative test to sort (as maximum, minimum, or neither) any critical points of $f(x) = 10x^4 - 8x^3 + x^2 + 2$.
10. Explain why every cubic polynomial has exactly one inflection point.