

Exam #4

Math 121-H

Tuesday, November 29, 2005

For full credit show all work. When in doubt, explain your reasoning. Where possible give numerical results to three decimal places.

1. Find where the following function is concave up, where it is concave down, and identify any inflection points.

$$f(x) = x^4 - 8x^3 + 18x^2 - 16x + 5$$

2. Find $f(x)$ such that $f'(x) = x^2 - 1/x$ and $f(3) = 4$.
3. Given that $f(n + 2) = f(n + 1) - f(n)$ and that $f(0) = 2$ and $f(1) = 5$, find $f(n)$ for $n = 2, 3, 4, 5$.
4. Given $f(n + 2) = 12f(n) - 4f(n + 1)$ and $f(0) = 3$, $f(1) = -2$, find a closed-form expression for $f(n)$.
5. Compare and contrast functions that are defined recursively and functions that are defined in closed-form. What are their respective advantages and disadvantages?
6. Estimate the area under the curve $y = \sin(x) + 1$ on the interval $[0, \pi]$ using two inscribed rectangles and then by using two circumscribed rectangles.
7. Let M be a positive, unknown constant. Find the area under $y = 1/x$ from $x = M$ to $x = 5M$.
8. Given $f(n + 1) = (f(n))^2$, find the fixed points for f and for each one determine if it is stable or unstable.