Midterm 2 Worksheet

Math 251

1. Let $f(x)$ be a differentiable function. Which of the following is true?

A. every critical point of f is also an inflection point.

B. every inflection point of f is also a critical point.

C. every saddle point of f is also an inflection point.

D. every inflection point of f is also a saddle point.

2. Find $\dfrac{d}{dx}\left[\dfrac{x^2\sin(x^2)-\log_2(x)}{\tan^{-1}(x)}\right]$.

3. Suppose you're selling concert tickets. You have to pay the band \$20 for every one you print, and you sell them at an increasing price: if you print n tickets, you sell them for $p(n) = n^{1.1}$ each. How much profit do you make by selling the nth ticket?

4. Using the Inverse Function Theorem, show that $\dfrac{d}{dx}[\ln(x)] = \dfrac{1}{x}$.

5. Let $f(x) = x^3 - 3x^2$ on $[-1,3]$. Find and classify all extrema of f, and identify the global maximum and minimum.

6. The graph of $x\sin\left(\dfrac{\pi}{2}y\right) = y$ contains the point $(1,1)$. Find the equation of the tangent line there.