MATH 211 Last Examin SHOW all work; be NEAT; use ONE side of each page ONLY.

1. Find $\int x + 8x^3 + x^{-2} + x^{7/2} + \pi \, dx$

2. Find $\lim_{x \to \infty} \dfrac{x^3 - 7x + 15}{1 + 15x - 3x^3}$

3. Find $\lim_{x \to -\infty} \dfrac{x}{x^2+1}$

4. Find $\lim_{x \to \infty} (\sqrt{x+2} - \sqrt{x})$

In 5 & 6 use the differential to approximate the no..

5. $\sqrt{26}$

6. $(17)^{3/2}$

7. Find $v(t)$, the velocity, & $s(t)$, the position, given that acceleration is $a(t) = t+2$ and $v(0) = 0$ and $s(1) = 2$.

8. Let $f(x) = 4x(x-1)(2-x)(x-3)^2(x^2+4)$ where is $f(x) = 0$? where is $f(x) > 0$? where is $f(x) < 0$?

9. Since $\lim_{x \to 25} \sqrt{x} = 5$, Find a $\delta > 0$ that works for $\varepsilon = 1.0$ that is find δ so that $0 < |x - 25| < \delta \Rightarrow |\sqrt{x} - 5| < \varepsilon = 1$.

10. Graph $f(x)$ and point out all local min's & local max's and points of inflection given:

I. About $f(x)$: $f(0) = 4$, $f(1) = 6$, $f(2) = 4$, $f(5) = 2$

$\lim_{x \to \infty} f(x) = \infty$ $\lim_{x \to -\infty} f(x) = 0$.

II. About $f'(x)$: $f'(x) = 0$ at $x = 1$ & $x = 3$, $f'(x) < 0$ for $1 < x < 3$, $f'(x) > 0$ for $-\infty < x < 1$ and $3 < x < \infty$; $\lim_{x \to \infty} f'(x) = \infty$, $\lim_{x \to -\infty} f'(x) = 0$.

III. About $f''(x)$: $f''(x) = 0$ at $x = 0$ & $x = 2$, $f''(x) < 0$ for $0 < x < 2$, $f''(x) > 0$ for $-\infty < x < 0$ and $2 < x < +\infty$.