

MATH 211 Test 2 Spring '02 NAME:

Show your work to get credit.

- 1.(10pts) Given $f(x) = \sqrt{x}$, find $f'(x)$ using the definition $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$.
- 2.(36pts) Find the derivatives of the following:
 - a. $f(x) = (\sin x + x^3)(\tan x + \sqrt{x})$
 - b. $g(x) = \frac{x^2 + x - 3}{x + 1}$
 - c. $h(x) = \sin((\cos x))$
 - d. $f(x) = e^{x^2} + \tan^{-1} x^2$
 - e. $g(x) = \sec(7x)$
 - f. $f(x) = \sinh(x) + \sin^{-1}(x)$.
- 3.(10pts) Find an equation of the tangent line to the curve astroid $x^{2/3} + y^{2/3} = 4$ at the point $(-3\sqrt{3}, 1)$. (Hint: implicit differentiation)
- 4.(10pts) The altitude of a triangle is increasing at a rate of 2 cm/min and the base is decreasing at a rate of 1 cm/min . At what rate is the area of the triangle is changing when the height of the triangle is 8 cm and the area is 100 cm^2 .
- 5.(14pts) Given $f(x) = 2 + 3x - x^3$, find
 - a. all critical numbers;
 - b. the intervals of increase or decrease;
 - c. the intervals of concavity and the inflection points.