

Calculus 1 - Review for Test 2 - Spring 2001

1. Know your definitions: a) continuity at a point $x = a$ b) limit definition of a derivative
2. Use the definition of $f'(x)$ to compute the derivative of $f(x) = x^2 + 3x$.
3. Find the equation of the tangent line to $y = 3/x^2$ at the point $(1, 3)$.
4. Compute the derivative $\frac{dy}{dx}$ of the following functions:
 - a. $y = 3x^3 - 7x + 2$
 - b. $y = 2\sqrt{x} - 3 + \frac{5}{x^5} + \frac{\sin x}{\tan x}$
 - c. $y = \frac{3x^3 - 5x + 1}{3x}$ (hint: don't use the quotient rule).
 - d. $y = \frac{x^2 - 1}{\sin x}$
 - e. $y = x^3 \sec x$
5. Use the chain rule to compute the derivatives of the following functions:
 - a. $\sin^5 x$
 - b. $\tan(3x^2 - 8x)$
 - c. $\frac{1}{(2x^3 - 5x)^2}$
6. A rock is thrown upwards from the surface of Uranus and lands in a crater. Its position (height) at any time can be represented by the formula $s = -24t^2 + 240t$ (feet).
 - a) find formulas for the velocity and acceleration of the rock at any time t .
 - b) find the height, speed, and direction of motion (upwards or downwards) at $t = 12$
 - c) find the maximum height of the rock.
 - d) if the rock is travelling at a speed of 456 feet/sec when it lands, how deep is the crater on Uranus?
7. Implicit differentiation, find $\frac{dy}{dx}$ for $x^2 + 3xy = y^3 + 2$
8. Simple Related Rates problem.