

Higher Order Differentiation and Implicit Differentiation

1. Find the 1st and 2nd order derivatives for:

a) $f(x) = 5x^4 + 2x^3 - 7x$

b) $f(x) = \cos^3(5x)$

b) $f(x) = e^{2x} \ln x$

2. If a particle is projected vertically upward from ground level with an initial velocity v_o , its height after t seconds is $s(t) = v_o t - 16t^2$ meters. Suppose $v_o = 800$ meters per second.

a) What is the velocity of the particle at time t ?

b) At what time does the particle reach its maximum height?

c) What is the maximum height?

d) How long does it take for the object to strike the ground?

e) At what time(s) is the object at a height of 9216 feet?

f) What is the velocity of the object when it is at a height of 9216 feet?

g) Is the acceleration of the object constant?

3. Using implicit differentiation

a) $x^3 + x^2y + xy^2 + y^3 = 0$ (with respect to x) b) $x \sin y = y \cos x$ (with respect to x)

c) $3x^4 - 4x^3 = 12$ find the second order derivative with respect to x

4. Determine the equation of the tangent line to the curve $x^2 + 4y^3 = -28$ when $y = -2$