

Worksheet 6
Sep 11, 2018

1. The position function of a particle is given by:

$$s = t^3 - 4.5t^2 - 7t, t \geq 0$$

- (a) Find the velocity and acceleration of the particle.
- (b) When does the particle reach a velocity of 5 m/s
- (c) When is the acceleration 0? What is the significance of this value of t?

2. Find dy/dx by implicit differentiation

(a) $x^2 + xy - y^2 = 4$

(b) $e^{x/y} = x - y$

(c) $4 \cos(x) \sin(y) = 1$

3. Use implicit differentiation to find an equation of the tangent line to the curve at the given point.

(a) $x^2 + xy + y^2 = 3, (1, 1)$

(b) $x^2 + y^2 = (2x^2 - x)^2, (1, 1/2)$

4. Find the number of critical points

(a) $f(x) = 4 + \frac{1}{3}x - \frac{1}{2}x^2$

(b) $f(x) = x^3 + 3x^2 - 24x$

(c) $s(t) = 3t^4 + 4t^3 - 6t^2$

5. Find absolute max and min on interval

(a) $f(x) = x^4 - 2x^2 + 3, [-2, 3]$

(b) $f(t) = t\sqrt{4 - t^2}, [-1, 2]$

(c) $f(x) = \ln(x^2 + x + 1), [-1, 1]$

6. Find the intervals on which f is increasing or decreasing.

Find the local maximum and minimum values of f .

Find the intervals of concavity and the inflection points.

(a) $f(x) = 2x^3 + 3x^2 - 36x$

(b) $f(x) = \sin^2(x) + \cos^2(x), 0 \leq x \leq 2\pi$

(c) $f(x) = x\sqrt{x+3}$