Math 1431

Section 16679

Bekki George: rageorge@central.uh.edu

University of Houston

09/24/19

Office Hours: Tuesdays & Thursdays 11:45-12:45
(also available by appointment)
Office: 218C PGH

Course webpage: www.casa.uh.edu

Questions

Quiz 9 Questions

9) Find $\dfrac{d^2y}{dx^2}$ in terms of x and y given $-3x^2 + xy = 11$.

Quiz 9 Questions

10) Find $\dfrac{d^2y}{dx^2}$ at the point (1,3) given $x^2 + y^2 = 10$.

Quiz 9 Questions

12) Find $\frac{dy}{dx}$ given $\frac{3x}{\sqrt{x^2+4}}$

Popper 07

1. Supposed both the radius and area of a circle change with respect to time. Take the derivative of $A = \pi r^2$ with respect to time.

Section 3.1 - Related Rates

3. Suppose you are set up a camera 3000 ft from where a rocket will launch. If the rocket is rising vertically at the rate of 880 ft/sec when it is 4000 feet up, how fast is the camera-to-rocket distance changing at the instant?

Section 3.1 - Related Rates

4. Using the same conditions for the rocket in #3, how fast must the camera elevation angle change at the instant to keep the rocket in sight?

Section 3.1 - Related Rates

5. A point moves along the curve $y = 2x^2 + 1$ in such a way that the y value is decreasing at the rate of 2 units per second. At what rate is x changing when x $= \frac{3}{2}$?

Section 3.1 - Related Rates

6. Suppose a spherical balloon is inflated at the rate of 10 cubic centimeters per minute. How fast is the radius increasing when the radius is 5 centimeters?

Section 3.1 - Related Rates

7. A man standing 3 feet from the base of a lamppost casts a shadow 4 feet long. If the man is 6 feet tall and walks away from the lamppost at a speed of 400 feet per minute, at what rate will his shadow lengthen?

7. How fast is the tip of his shadow moving?

Section 3.1 - Related Rates

8. The legs of an isosceles triangle are 2 feet long. If the altitude is decreasing at a rate of 3 inches per second, at what rate is the base angle changing when the height is 1.5 feet?

Section 3.1 - Related Rates

Position, velocity and acceleration of an object:

- If $x(t)$ represents the position function then
- $v(t) = x'(t)$ is the velocity function and
- $a(t) = v'(t) = x''(t)$ is the acceleration function.

Section 3.1 - Related Rates

Examples:

1. A body moves along a horizontal line according to $x(t) = t^3 - 9t^2 + 24t$, where t is in seconds. Find the position, velocity and acceleration at $t_0 = 1$.

Section 3.1 - Related Rates

2. A body moves along a horizontal line according to $x(t) = t^3 - 9t^2 + 24t$, where t is in seconds. When is x increasing, and when is it decreasing?

Section 3.1 - Related Rates

3. If $x(t) = \frac{1}{2}t^4 - 5t^3 + 12t^2$, find the velocity of the moving object when its acceleration is zero.

Section 3.1 - Related Rates

Free fall of an object:

$$y(t) = -\frac{1}{2}gt^2 + v_0t + y_0$$

Where g is the gravitational constant (32 ft per second or 9.8 meters per second).

Section 3.1 - Related Rates

4. An object is dropped from a height of 20 feet. If we neglect air friction, how long will it take for the object to hit the ground? Give the velocity of the object on impact.

Popper 07

2. If the velocity of an object is constant, then its acceleration is zero.

Popper 07

3. Suppose the position equation for a moving object is given by $x(t) = 3t^2 + 2t + 5$ where x is measured in meters and t is measured in seconds. Find the velocity of the object when $t = 2$.