

2.5 – 2.6 AP Questions

Name: _____

2005 Form B AP Calculus Free-Response Questions (Non-Calc)

5. Consider the curve given by $y^2 = 2 + xy$.
- (a) Show that $\frac{dy}{dx} = \frac{y}{2y - x}$.
 - (b) Find all points (x, y) on the curve where the line tangent to the curve has slope $\frac{1}{2}$.
 - (c) Show that there are no points (x, y) on the curve where the line tangent to the curve is horizontal.
 - (d) Let x and y be functions of time t that are related by the equation $y^2 = 2 + xy$. At time $t = 5$, the value of y is 3 and $\frac{dy}{dt} = 6$. Find the value of $\frac{dx}{dt}$ at time $t = 5$.

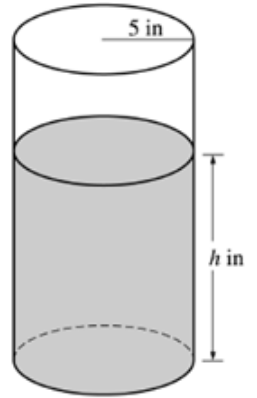
2004 AP Calculus Free-Response Question (Non-Calc)

4. Consider the curve given by $x^2 + 4y^2 = 7 + 3xy$.
- (a) Show that $\frac{dy}{dx} = \frac{3y - 2x}{8y - 3x}$.
 - (b) Show that there is a point P with x -coordinate 3 at which the line tangent to the curve at P is horizontal. Find the y -coordinate of P .
 - (c) Find the value of $\frac{d^2y}{dx^2}$ at the point P found in part (b).

2003 AP Calculus Free-Response Question (Non-Calc)

5. A coffeepot has the shape of a cylinder with radius 5 inches, as shown in the figure above. Let h be the depth of the coffee in the pot, measured in inches, where h is a function of time t , measured in seconds. The volume V of coffee in the pot is changing at the rate of $-5\pi\sqrt{h}$ cubic inches per second. (The volume V of a cylinder with radius r and height h is $V = \pi r^2 h$.)

(a) Show that $\frac{dh}{dt} = -\frac{\sqrt{h}}{5}$.



2016 AP Calculus Free-Response Questions (Non-Calc)

4. Consider the differential equation $\frac{dy}{dx} = x^2 - \frac{1}{2}y$.

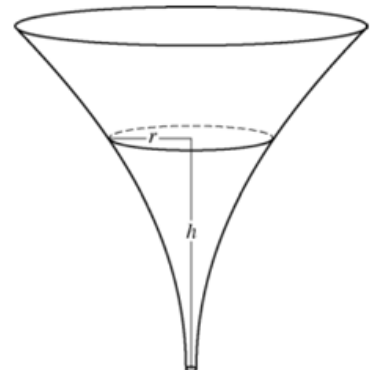
(a) Find $\frac{d^2y}{dx^2}$ in terms of x and y .

2016 AP Calculus Free-Response Question (Non-calc).

The inside of a funnel of height 10 inches has circular cross sections, as shown in the figure above. At height h , the radius of the funnel is given by $r = \frac{1}{20}(3 + h^2)$, where $0 \leq h \leq 10$. The units of r and h are inches.

- (c) The funnel contains liquid that is draining from the bottom. At the instant when the height of the liquid is $h = 3$ inches, the radius of the surface of the liquid is decreasing at a rate of $\frac{1}{5}$ inch per second. At this instant, what is the rate of change of the height of the liquid with respect to time?

Question 5



When the height of a cylinder is 12 cm and the radius is 4 cm, the circumference of the cylinder is increasing at a rate of $\frac{\pi}{4}$ cm/min, and the height of the cylinder is increasing four times faster than the radius. How fast is the volume of the cylinder changing?

- A. $\frac{\pi}{4}$ cm³ / min
- B. 4π cm³ / min
- C. 12π cm³ / min
- D. 20π cm³ / min
- E. 80π cm³ / min

Find $\frac{dy}{dx}$ if $3xy = 4x + y^2$.

A) $\frac{4-3y}{2y-3x}$

B) $\frac{3x-4}{2x}$

C) $\frac{3y-x}{2}$

D) $\frac{3y-4}{2y-3x}$

E) $\frac{4+3y}{2y+3x}$

The radius of a circle is decreasing at a constant rate of 0.1 centimeters per second. In terms of the circumference, C , what is the rate of change of the area of the circle, in square centimeters per second?

(A) $-(0.2)\pi C$

(B) $-(0.1)C$

(C) $-\frac{(0.1)\pi C}{2\pi}$

(D) $(0.1)^2 C$

(E) $(0.1)^2 \pi C$