

2004 AP Calculus AB FRQ (Form A) Question 6

No Calculator - In Class

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

- (a) On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated.
(Note: Use the axes provided in the pink test booklet.)
- (b) While the slope field in part (a) is drawn at only twelve points, it is defined at every point in the xy -plane. Describe all points in the xy -plane for which the slopes are positive.
- (c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(0) = 3$.

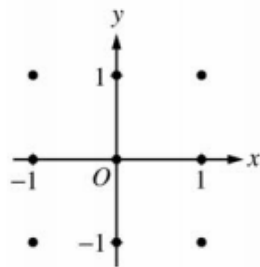


2006 AP Calculus AB FRQ (Form B) Question 5

No Calculator - In Class

Consider the differential equation $\frac{dy}{dx} = (y - 1)^2 \cos(\pi x)$.

- (a) On the axes provided, sketch a slope field for the given differential equation at the nine points indicated.
(Note: Use the axes provided in the exam booklet.)



- (b) There is a horizontal line with equation $y = c$ that satisfies this differential equation. Find the value of c .
(c) Find the particular solution $y = f(x)$ to the differential equation with the initial condition $f(1) = 0$.

2010 AP Calculus AB FRQ (Form A) Question 6

No Calculator - HW Not Timed

Solutions to the differential equation $\frac{dy}{dx} = xy^3$ also satisfy $\frac{d^2y}{dx^2} = y^3(1 + 3x^2y^2)$. Let $y = f(x)$ be a particular solution to the differential equation $\frac{dy}{dx} = xy^3$ with $f(1) = 2$.

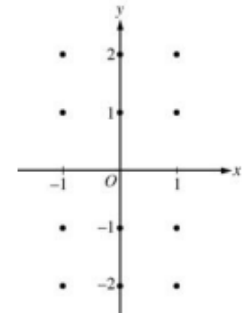
- Write an equation for the line tangent to the graph of $y = f(x)$ at $x = 1$.
- Use the tangent line equation from part (a) to approximate $f(1.1)$. Given that $f(x) > 0$ for $1 < x < 1.1$, is the approximation for $f(1.1)$ greater than or less than $f(1.1)$? Explain your reasoning.
- Find the particular solution $y = f(x)$ with initial condition $f(1) = 2$.

2005 AP Calculus AB FRQ (Form A) Question 6

No Calculator - HW Timed 15 minutes

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

- (a) On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated.
(Note: Use the axes provided in the pink test booklet.)
- (b) Let $y = f(x)$ be the particular solution to the differential equation with the initial condition $f(1) = -1$. Write an equation for the line tangent to the graph of f at $(1, -1)$ and use it to approximate $f(1.1)$.
- (c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(1) = -1$.

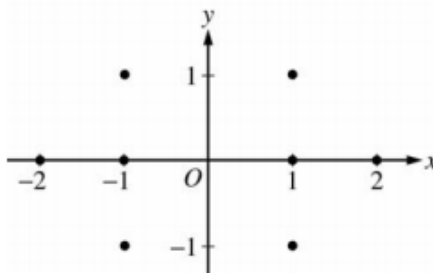


2006 AP Calculus AB FRQ (Form A) Question 5

No Calculator - HW Timed 15 minutes

Consider the differential equation $\frac{dy}{dx} = \frac{1+y}{x}$, where $x \neq 0$.

- (a) On the axes provided, sketch a slope field for the given differential equation at the eight points indicated.
(Note: Use the axes provided in the pink exam booklet.)



- (b) Find the particular solution $y = f(x)$ to the differential equation with the initial condition $f(-1) = 1$ and state its domain.