AP Calculus AB **MC "Pop" Quiz** **Name** Dimarco

NO Calculator!

Directions: Show work directly on this page. Circle your answer. Answer every problem.

1. What is the x-coordinate of the point of inflection on the graph of $y = \frac{1}{3}x^3 + 5x^2 + 24$?

(A) 5 (B) 0 (C) $-\frac{10}{3}$ (D) -5 (E) -10

$y' = x^2 + 10x$

$y'' = 2x + 10 = 0$

$2x = -10$

$x = -5$

y'' — -5

2. $\int_1^2 \frac{1}{x^2}\,dx = \int_1^2 x^{-2}dx = -x^{-1}\Big|_1^2 = -\frac{1}{x}\Big|_1^2 = -\frac{1}{2} - \left(\frac{-1}{1}\right) = \frac{1}{2}$

(A) $-\frac{1}{2}$ (B) $\frac{7}{24}$ (C) $\frac{1}{2}$ (D) 1 (E) 2 ln 2

3. If f is continuous for $a \le x \le b$ and differentiable for $a < x < b$, which of the following could be false?

(A) $f'(c) = \frac{f(b) - f(a)}{b - a}$ for some c such that $a < c < b$. MVT

(B) $f'(c) = 0$ for some c such that $a < c < b$.

(C) f has a minimum value on $a \le x \le b$.

(D) f has a maximum value on $a \le x \le b$.

$\Big\}$ EVT

(E) $\int_a^b f(x)\,dx$ exists. FTC

Product Rule

4. If $x^2 + xy = 10$, then when $x = 2$, $\frac{dy}{dx} =$

$2^2 + 2y = 10$ $(2,3)$

$2y = 6$

$y = 3$

(A) $-\frac{7}{2}$ (B) -2 (C) $\frac{2}{7}$ (D) $\frac{3}{2}$ (E) $\frac{7}{2}$

$2x + y + x\frac{dy}{dx} = 0$

$x\frac{dy}{dx} = -2x - y$

$\frac{dy}{dx} = \frac{-2x-y}{x}$ $\left.\frac{dy}{dx}\right|_{(2,3)} = \frac{-2(2)-(3)}{2} = \frac{-7}{2}$

5. $\int_1^e \left(\frac{x^2-1}{x}\right) dx =$

(A) $e - \frac{1}{e}$ (B) $e^2 - e$ (C) $\frac{e^2}{2} - e + \frac{1}{2}$ (D) $e^2 - 2$ (E) $\frac{e^2}{2} - \frac{3}{2}$

$\int_1^e \left(x - \frac{1}{x}\right)dx = \left.\left(\frac{1}{2}x^2 - \ln x\right)\right|_1^e$

$= \frac{1}{2}e^2 - \ln e - \left(\frac{1}{2}(1)^2 - \ln 1\right)$

$= \frac{1}{2}e^2 - 1 - \frac{1}{2} + 0$

$= \frac{e^2}{2} - \frac{3}{2}$

6. Let f and g be differentiable functions with the following properties:

(i) $g(x) > 0$ for all x

(ii) $f(0) = 1$

If $h(x) = f(x)g(x)$ and $h'(x) = f(x)g'(x)$, then $f(x) =$

product rule

(A) $f'(x)$ (B) $g(x)$ (C) e^x (D) 0 (E) 1

$h'(x) = f'(x)g(x) + f(x)g'(x)$

Since $h'(x) = f(x)g'(x)$, $f'(x) = 0$

Since $f(0) = 1$, $f(x) \neq 0$

7. If $F(x) = \int_0^x \sqrt{t^3 + 1}\, dt$, then $F'(2) =$

(A) -3 (B) -2 (C) 2 (D) 3 (E) 18

$F'(x) = \sqrt{x^3 + 1}$ FTC

$F'(2) = \sqrt{2^3 + 1}$

$= \sqrt{9}$

8. If $f(x) = \sin(e^{-x})$, then $f'(x) =$

Chain Rule

$f'(x) = \cos(e^{-x}) \cdot -e^{-x}$

$= -e^{-x}\cos(e^{-x})$

(A) $-\cos(e^{-x})$

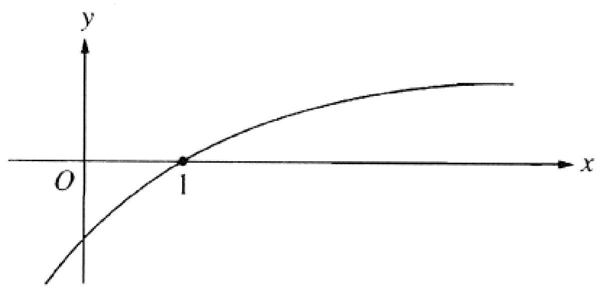
(B) $\cos(e^{-x}) + e^{-x}$

(C) $\cos(e^{-x}) - e^{-x}$

(D) $e^{-x}\cos(e^{-x})$

(E) $-e^{-x}\cos(e^{-x})$

9.



The graph of a twice-differentiable function f is shown in the figure above. Which of the following is true?

$f(1) = 0$

$f'(1) > 0$

$f''(1) < 0$ (ccd)

(A) $f(1) < f'(1) < f''(1)$

(B) $f(1) < f''(1) < f'(1)$

(C) $f'(1) < f(1) < f''(1)$

(D) $f''(1) < f(1) < f'(1)$

(E) $f''(1) < f'(1) < f(1)$

sign change of f''

10. If $f''(x) = x(x+1)(x-2)^2$, then the graph of f has inflection points when $x =$

(A) -1 only (B) 2 only $\boxed{\text{(C) } -1 \text{ and } 0 \text{ only}}$ (D) -1 and 2 only (E) -1, 0, and 2 only

$f''(x)$: POS | -1 * | NEG | 0 * | POS | 2 | POS