

Name _____ DUE DATE: _____

Directions:

- Read each problem carefully and use your knowledge of calculus to determine your answer.
- In order to receive FULL CREDIT you must either SHOW ALL WORK or EXPLAIN how you got your answer!! PLEASE NOTE: A multiple choice answer alone without any work will only receive half credit.

1) Evaluate $\int x \cos 2x \, dx$.

(A) $\frac{1}{2}x \cos 2x - \frac{1}{4} \sin 2x + C$

(B) $\frac{1}{2}x \sin 2x - \frac{1}{4} \cos 2x + C$

(C) $\frac{1}{2}x \sin 2x - \frac{1}{4} \sin 2x + C$

(D) $\frac{1}{2}x \cos 2x + \frac{1}{4} \sin 2x + C$

(E) $\frac{1}{2}x \sin 2x + \frac{1}{4} \cos 2x + C$

2) Let $f(x) = \begin{cases} 2x - 5, & \text{for } x \leq 3 \\ \sqrt{x+1}, & \text{for } x > 3 \end{cases}$

Find $\int_0^8 f(x) \, dx$.

(A) 24

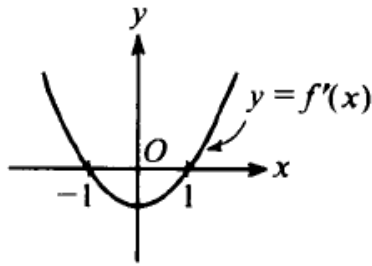
(B) $\frac{45}{2}$

(C) $\frac{52}{3}$

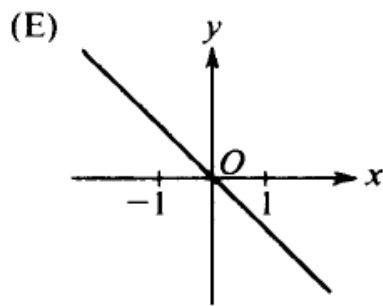
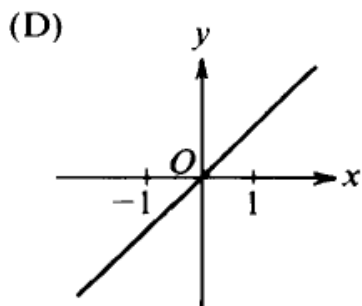
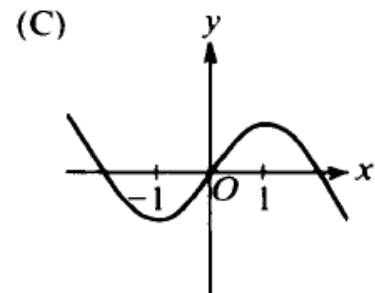
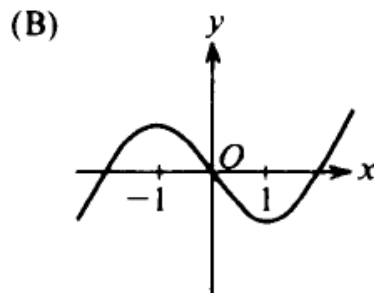
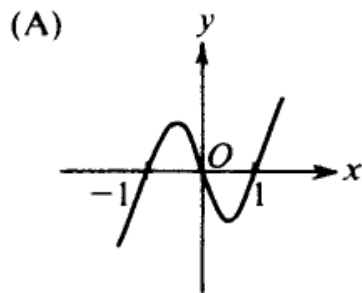
(D) $\frac{20}{3}$

(E) $\frac{32}{3}\sqrt{2} - 2\sqrt{3}$

3)



The graph of the derivative of f is shown in the figure above. Which of the following could be the graph of f ?



4)

$$\lim_{h \rightarrow 0} \frac{\tan\left(\frac{\pi}{3} + h\right) - \tan\frac{\pi}{3}}{h} =$$

- (A) 4 (B) $\sqrt{3}$ (C) $\frac{1}{\sqrt{3}}$ (D) $\frac{\sqrt{3}}{2}$ (E) $\frac{1}{2}$

5) Find $\lim_{x \rightarrow 1} \frac{\int_1^x e^{t^2} dt}{x^2 - 1}$ is

6) $\int \frac{1}{x^2 - 6x + 8} dx =$

7) Let f be the function given by $f(x) = 3e^{2x}$ and let g be the function given by $g(x) = 6x^3$. At what value of x do the graphs of f and g have parallel tangent lines?

- (A) -0.701
- (B) -0.567
- (C) -0.391
- (D) -0.302
- (E) -0.258

8) If $f(x) = \begin{cases} \ln x & \text{for } 0 < x \leq 2 \\ x^2 \ln 2 & \text{for } 2 < x \leq 4, \end{cases}$ then $\lim_{x \rightarrow 2} f(x)$ is

- (A) $\ln 2$
- (B) $\ln 8$
- (C) $\ln 16$
- (D) 4
- (E) nonexistent

9) The line tangent to the graph of $y = x^3 - 3x^2 - 2x + 1$ at $x = -1$ will also intersect the curve at which of the following values of x ?

- (A) $x = 4$ (B) $x = 5$ (C) $x = 6$ (D) $x = 7$ (E) $x = 8$

10) Assume that $g'(x) = h(x)$ and $f(x) = x^2$. Which of the following expressions is equal to $\frac{d}{dx}f(g(x))$?

- (A) $2x g(x)$ (B) $2x h(x)$ (C) $2 g(x) h(x)$ (D) $f'(x) g(x) h(x)$ (E) $x^2 h(x) + 2x g(x)$

11) A particle is moving along the x -axis according to the equation $x(t) = 4t^2 - \sin 3t$ where x is given in feet and t is given in seconds. Find the acceleration at $t = \frac{\pi}{2}$.

- (A) -1 ft/sec^2 (B) 5 ft/sec^2 (C) 11 ft/sec^2 (D) 17 ft/sec^2 (E) $2\pi \text{ ft/sec}^2$

12) Find $\frac{dy}{dx}$ if $\tan y = (x - y)^2$

