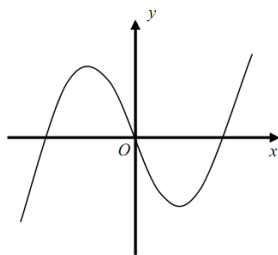


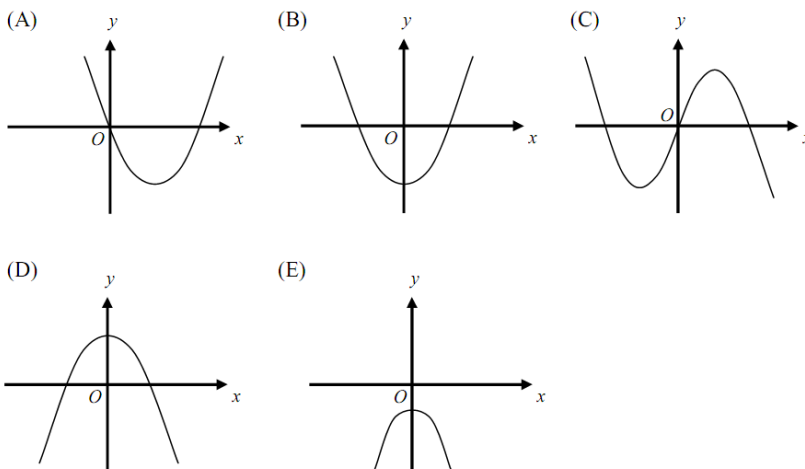
AP Calculus TEST: 2.1-2.4 , NO CALCULATOR

Part Ein: Multiple Choice—Put the correct CAPITAL letter in the space to the left of each question.



Graph of f

_____ 1. The graph of a function f is shown above. Which of the following could be the graph of f' , the derivative of f ?



_____ 2. In the xy -plane, the line $x + y = k$, where k is a constant, is tangent to the graph of $y = x^2 + 3x + 1$. What is the value of k ?

- (A) -3 (B) -2 (C) -1 (D) 0 (E) 1

$$f(x) = \begin{cases} cx + d & \text{for } x \leq 2 \\ x^2 - cx & \text{for } x > 2 \end{cases}$$

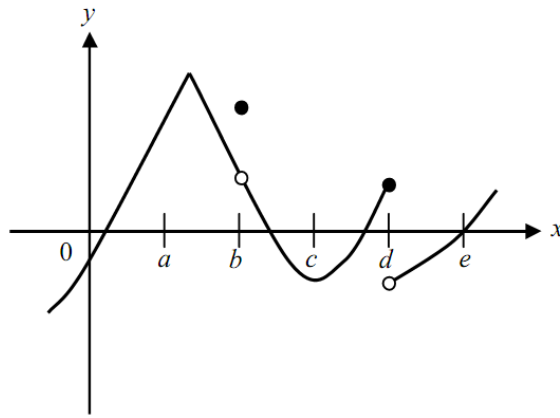
_____ 3. Let f be the function defined above, where c and d are constants. If f is differentiable at $x = 2$, what is the value of $c + d$?

_____ 4. If $y = \frac{2x+3}{3x+2}$, then $\frac{dy}{dx} =$

- (A) $\frac{12x+13}{(3x+2)^2}$ (B) $\frac{12x-13}{(3x+2)^2}$ (C) $\frac{5}{(3x+2)^2}$ (D) $\frac{-5}{(3x+2)^2}$ (E) $\frac{2}{3}$

_____ 5. $\lim_{h \rightarrow 0} \frac{3\sec(\pi+h) - 3\sec \pi}{h} =$

- (A) -1 (B) 0 (C) -3 (D) π (E) DNE



Graph of f

_____ 6. The graph of a function f is shown above. At which value of x is f continuous, but not differentiable?

- (A) a (B) b (C) c (D) d (E) e

$$g(x) = \begin{cases} x+2, & x \leq 3 \\ 4x-7, & x > 3 \end{cases}$$

_____ 7. Let f be the function given above. Which of the following statements are true about g ?

I. $\lim_{x \rightarrow 3} g(x)$ exists

II. g is continuous at $x=3$

III. g is differentiable at $x=3$

- (A) None (B) I only (C) II only (D) I and II only (E) I, II, and III

_____ 8. If $c(n)$ measures the about calories a math student burns taking an AP calculus test with respect to n , the number of problems he/she has succesfully completed, what is the practical meaning of the $c'(8) = 480$?

- (A) When the student has 8 problems answered correctly, he has burned 480 calories.
 (B) When the student has burned 8 calories, the student is burning calories at 480 calories per question.
 (C) When the student has 8 problems answered correctly, the ice cream company KNOWS!!
 (D) When the student has 8 problems answered correctly, he/she is burning 480 calories per question.
 (E) When the student has burned 8 calories, he/she is correctly answering 480 questions per calorie.

_____ 9. An equation of the line normal to the graph of $y = x^3 + 3x^2 + 7x - 1$ is

- (A) $4x+3y = -10$ (B) $x-4y = 23$ (C) $4x-y = 2$ (D) $x+4y = 25$ (E) $x+4y = -25$

_____ 10. If $f(x) = (x-1)\sin x$, then $f'(0) =$

- (A) -2 (B) -1 (C) 0 (D) 1 (E) 2

_____ 11. If $f(x) = 3 - 4|x+5|$ for all x , then the value of the derivative $f'(x)$ at $x = -5$ is

- (A) -4 (B) 0 (C) 4 (D) 3 (E) DNE

Part Dos: Free Response—Do all work below the line.

12. If $f(x) = \frac{1}{3}x^3 - \frac{1}{2}x^2 - 6x + 4$

(a) Let $k(x) = f'(x)$. Find $k(x)$ and $k'(x)$.

(b) Find $k(-1)$ and $k'(-1)$.

(c) Find the equation of the tangent line, in Taylor Form, of $k(x)$ at $x = -1$.

(d) Find the equation of the normal line, in Taylor Form, of $k(x)$ at $x = -1$.

(e) The equation of the normal line to $k(x)$ at $x = -1$ intersects the graph of $k(x)$ at another x -value.

Find this x -value. Show the work that leads to your answer.
