AP CALCULUS AB

ACTUAL EXAM

SECTION I
MULTIPLE CHOICE
QUESTIONS
2003

2003 AP Calculus AB Exam - Multiple Choice

CALCULUS AB
SECTION I, Part A
Time—55 minutes
Number of questions—28

A CALCULATOR MAY NOT BE USED ON THIS PART OF THE EXAMINATION.

Directions: Solve each of the following problems, using the available space for scratchwork. After examining the form of the choices, decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the test book. Do not spend too much time on any one problem.

In this test:

(1) Unless otherwise specified, the domain of a function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

(2) The inverse of a trigonometric function f may be indicated using the inverse function notation f^{-1} or with the prefix "arc" (e.g., $\sin^{-1} x = \arcsin x$).

E

1. If $y = (x^3 + 1)^2$, then $\frac{dy}{dx} =$

(A) $(3x^2)^2$ (B) $2(x^3 + 1)$ (C) $2(3x^2 + 1)$ (D) $3x^2(x^3 + 1)$ (E) $6x^2(x^3 + 1)$

$y' = 2(x^3+1)^1(3x^2)$

D

2. $\int_0^1 e^{-4x}\,dx =$

(A) $\frac{-e^{-4}}{4}$ (B) $-4e^{-4}$ (C) $e^{-4} - 1$ (D) $\frac{1}{4} - \frac{e^{-4}}{4}$ (E) $4 - 4e^{-4}$

$u = -4x$

$-\frac{1}{4}du = \cancel{-4}dx$

$-\frac{1}{4}\int e^u\,du$

$-\frac{1}{4}e^{-4x}\Big]_0^1$

$= -\frac{1}{4}(e^{-4} - e^0)$

$= -\frac{1}{4}(e^{-4} - 1)$

$= \frac{1}{4} - \frac{e^{-4}}{4}$

E

3. For $x \geq 0$, the horizontal line $y = 2$ is an asymptote for the graph of the function f. Which of the following statements must be true?

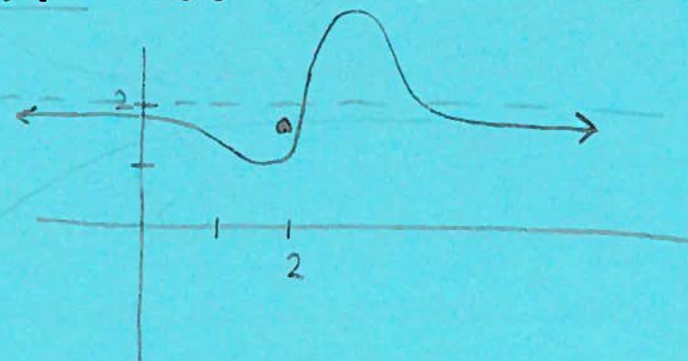
(A) $f(0) = 2$ F

T (B) $f(x) \neq 2$ for all $x \geq 0$

(C) $f(2)$ is undefined. F

(D) $\lim_{x \to 2} f(x) = \infty$ F

T (E) $\lim_{x \to \infty} f(x) = 2$



Can cross HA, but tails must approach 2 as $x \to \infty$

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

D

(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) $\frac{2}{3}$

$$y' = \frac{(3x+2)(2)-(2x+3)(3)}{(3x+2)^2}$$

$\cancel{6x}+4-\cancel{6x}-9$ $\quad \frac{-5}{}$

5. $\int_0^{\frac{\pi}{4}} \sin x \, dx =$

D

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

$$-\cos x \Big]_0^{\pi/4}$$

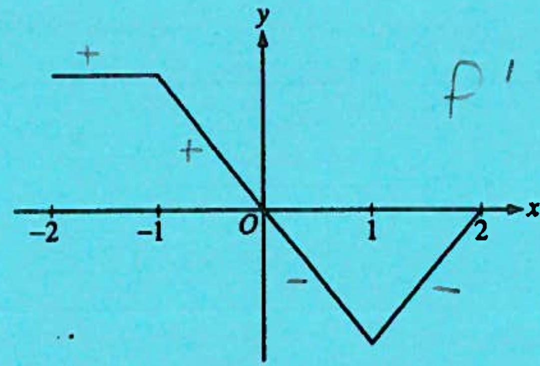
$$-\left(\cos\frac{\pi}{4}-\cos 0\right)$$

$$-\left(\frac{1}{\sqrt{2}}-1\right)$$

6. $\lim_{x\to\infty} \frac{x^3-2x^2+3x-4}{4x^3-3x^2+2x-1} =$

C

(A) 4 (B) 1 (C) $\frac{1}{4}$ (D) 0 (E) -1



Graph of f'

7. The graph of f', the derivative of the function f, is shown above. Which of the following statements is true about f ?

B

(A) f is decreasing for $-1 \le x \le 1$. F

(B) f is increasing for $-2 \le x \le 0$. T

(C) f is increasing for $1 \le x \le 2$. F

(D) f has a local minimum at $x = 0$. (max)

(E) f is not differentiable at $x = -1$ and $x = 1$.

8. $\int x^2 \cos(x^3)\,dx =$

$u = x^3$

$\frac{1}{3} du = \cancel{3}x^2 dx$

$\frac{1}{3}\int \cos u \, du$

$\frac{1}{3}\sin(x^3) + C$

B

(A) $-\frac{1}{3}\sin(x^3) + C$

(B) $\frac{1}{3}\sin(x^3) + C$

(C) $-\frac{x^3}{3}\sin(x^3) + C$

(D) $\frac{x^3}{3}\sin(x^3) + C$

(E) $\frac{x^3}{3}\sin\left(\frac{x^4}{4}\right) + C$

9. If $f(x) = \ln(x + 4 + e^{-3x})$, then $f'(0)$ is

A

(A) $-\frac{2}{5}$ (B) $\frac{1}{5}$ (C) $\frac{1}{4}$ (D) $\frac{2}{5}$ (E) nonexistent

$f' = \frac{1 - 3e^{-3x}}{x + 4 + e^{-3x}}$

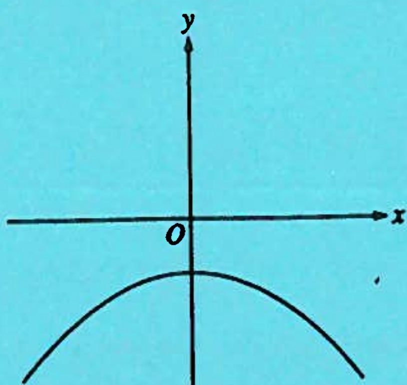
$f'(0) = \frac{1-3}{4+1} = \frac{-2}{5}$

dec CC ↓

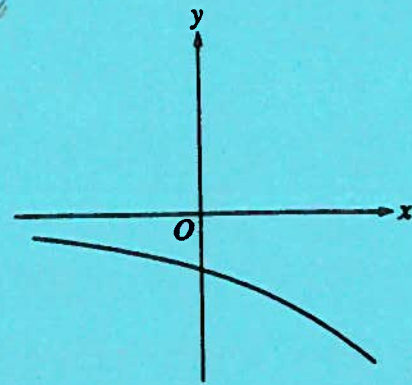
10. The function f has the property that $f(x)$, $f'(x)$, and $f''(x)$ are negative for all real values x. Which of the following could be the graph of f ?

B

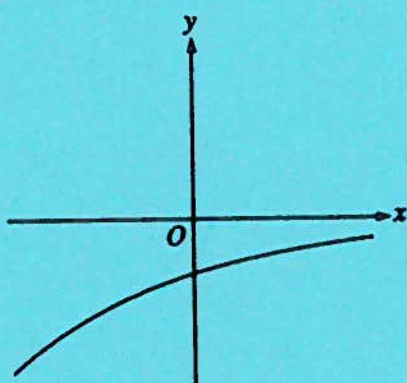
~~(A)~~



(B)



~~(C)~~



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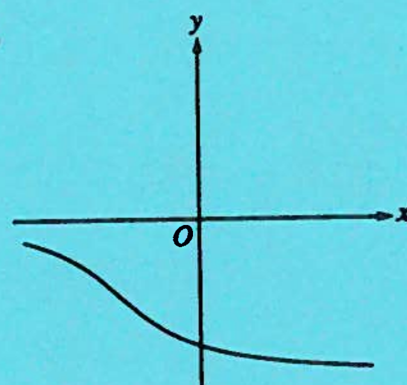
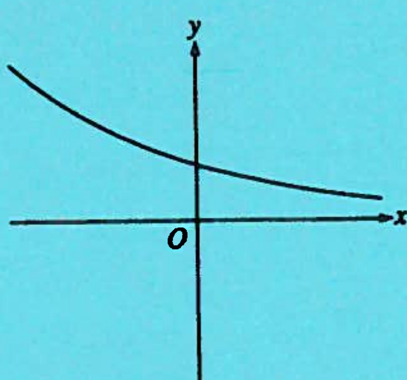


~~(E)~~



11. Using the substitution $u = 2x + 1$, $\int_0^2 \sqrt{2x+1}\, dx$ is equivalent to

C

(A) $\frac{1}{2}\int_{-1/2}^{1/2} \sqrt{u}\, du$ (B) $\frac{1}{2}\int_0^2 \sqrt{u}\, du$ (C) $\frac{1}{2}\int_1^5 \sqrt{u}\, du$ (D) $\int_0^2 \sqrt{u}\, du$ (E) $\int_1^5 \sqrt{u}\, du$

$u = 2x+1$

$\frac{1}{2} du = dx$

$\frac{1}{2}\int_1^5 u^{1/2}\, du$

$u = 2(0)+1$

$u = 1$

$u = 2(2)+1$

$u = 5$

12. The rate of change of the volume, V, of water in a tank with respect to time, t, is directly proportional to the square root of the volume. Which of the following is a differential equation that describes this relationship?

E

(A) $V(t) = k\sqrt{t}$

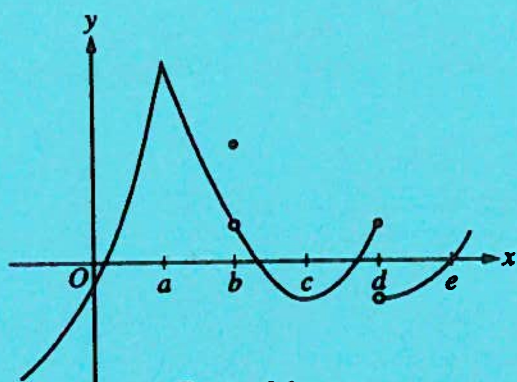
(B) $V(t) = k\sqrt{V}$

$\frac{dV}{dt} = k\sqrt{V}$

(C) $\frac{dV}{dt} = k\sqrt{t}$

(D) $\frac{dV}{dt} = \frac{k}{\sqrt{V}}$

(E) $\frac{dV}{dt} = k\sqrt{V}$



Graph of f

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

A

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

14. If $y = x^2 \sin 2x$, then $\frac{dy}{dx} =$

E

$y' = (x^2)\,2\cos 2x + \sin 2x\,(2x)$

$2x(x\cos 2x + \sin 2x)$

(A) $2x \cos 2x$

(B) $4x \cos 2x$

(C) $2x(\sin 2x + \cos 2x)$

(D) $2x(\sin 2x - x\cos 2x)$

(E) $2x(\sin 2x + x\cos 2x)$

15. Let f be the function with derivative given by $f'(x) = x^2 - \frac{2}{x}$. On which of the following intervals is f decreasing?

D

(A) $(-\infty, -1]$ only

(B) $(-\infty, 0)$

(C) $[-1, 0)$ only

(D) $(0, \sqrt[3]{2}]$

(E) $[\sqrt[3]{2}, \infty)$

$x^2 - \frac{2}{x} = 0$

$x^2 = \frac{2}{x}$

$x^3 = 2$

$x = \sqrt[3]{2}$

$x = 0 \leftarrow f'$ d

$f'(-1)$ $f'(1)$ $f'(2)$

$+$ 0 $-$ $\sqrt[3]{2}$ $+$

x, y

16. If the line tangent to the graph of the function f at the point (1, 7) passes through the point (−2, −2), then $f'(1)$ is

C

(A) −5 (B) 1 (C) 3 (D) 7 (E) undefined

$m = \frac{9}{3} = 3$

$f'' < 0$

17. Let f be the function given by $f(x) = 2xe^x$. The graph of f is concave down when

A

(A) $x < -2$ (B) $x > -2$ (C) $x < -1$ (D) $x > -1$ (E) $x < 0$

$f'(x) = 2x(e^x) + e^x(2)$

$= 2e^x(x+1)$

$f''(x) = 2e^x(1) + (x+1)(2e^x)$

$f''(x) = 2e^x(1 + x + 1)$

$= 2e^x(x+2) = 0$

$x = -2$

$f''(-3)$ ⊖ -2 ⊕ $f''(0)$

x	−4	−3	−2	−1	0	1	2	3	4
$g'(x)$	2	3	0	−3	−2	−1	0	3	2

\+ max − min +

18. The derivative g' of a function g is continuous and has exactly two zeros. Selected values of g' are given in the table above. If the domain of g is the set of all real numbers, then g is decreasing on which of the following intervals?

A

(A) $-2 \le x \le 2$ only ← Has only 2 zeros.

(B) $-1 \le x \le 1$ only

(C) $x \ge -2$

(D) $x \ge 2$ only

(E) $x \le -2$ or $x \ge 2$

19. A curve has slope $2x + 3$ at each point (x, y) on the curve. Which of the following is an equation for this curve if it passes through the point (1, 2) ?

D

(A) $y = 5x - 3$

(B) $y = x^2 + 1$

(C) $y = x^2 + 3x$

(D) $y = x^2 + 3x - 2$

(E) $y = 2x^2 + 3x - 3$

$\int y' = \int 2x + 3$

$y = x^2 + 3x + C$

$2 = 1^2 + 3 + C$

$-2 = C$

$Y = x^2 + 3x - 2$

$$f(x) = \begin{cases} \overset{5}{x + 2} & \text{if } x \le 3 \\ 4x - 7 & \text{if } x > 3 \end{cases}$$

$12 - 7 = 5$

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

D

I. $\lim_{x \to 3} f(x)$ exists. T

II. f is continuous at $x = 3$. T

III. f is differentiable at $x = 3$. F

(A) None

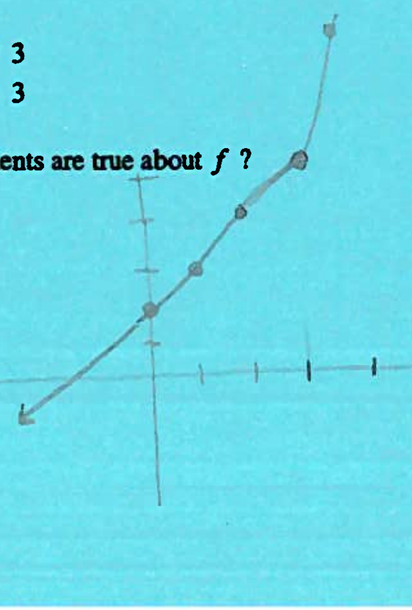
(B) I only

(C) II only

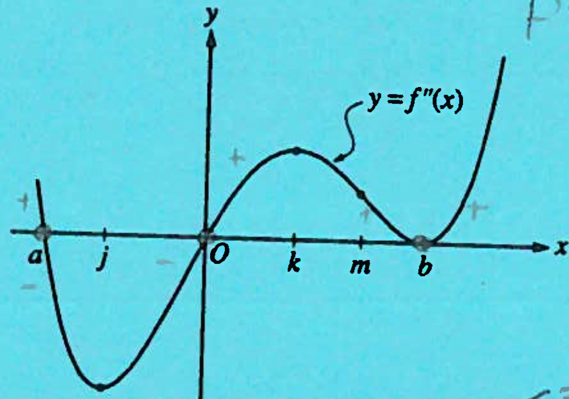
(D) I and II only

(E) I, II, and III

sharp point at $x = 3$



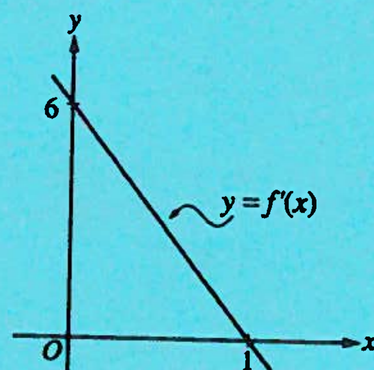
f''



=0 x = 0, x = a, x = b } Possible — does not change signs

A 21. The second derivative of the function f is given by $f''(x) = x(x-a)(x-b)^2$. The graph of f'' is shown above. For what values of x does the graph of f have a point of inflection?

(A) 0 and a only (B) 0 and m only (C) b and j only (D) 0, a, and b (E) b, j, and k



D 22. The graph of f', the derivative of f, is the line shown in the figure above. If $f(0) = 5$, then $f(1) =$

(A) 0 (B) 3 (C) 6 (D) 8 (E) 11

$\int_0^1 f'(t)\,dt = f(1) - f(0)$

$\frac{1}{2}(1)(6) = f(1) - 5$

$f(1) = 8$

E 23. $\frac{d}{dx}\left(\int_0^{x^2} \sin(t^3)\,dt\right) =$ $2x \cdot \sin(x^2)^3$

(A) $-\cos(x^6)$ (B) $\sin(x^3)$ (C) $\sin(x^6)$ (D) $2x\sin(x^3)$ (E) $2x\sin(x^6)$

C 24. Let f be the function defined by $f(x) = 4x^3 - 5x + 3$. Which of the following is an equation of the line tangent to the graph of f at the point where $x = -1$?

(A) $y = 7x - 3$

(B) $y = 7x + 7$

(C) $y = 7x + 11$

(D) $y = -5x - 1$

(E) $y = -5x - 5$

$f(-1) = -4 + 5 + 3 = 4$

$f'(x) = 12x^2 - 5$

$f'(-1) = 12 - 5 = 7$

$y - 4 = 7(x + 1)$

$y = 7x + 7 + 4$

25. A particle moves along the x-axis so that at time $t \geq 0$ its position is given by $x(t) = 2t^3 - 21t^2 + 72t - 53$. At what time t is the particle at rest?

E

(A) $t = 1$ only

(B) $t = 3$ only

(C) $t = \frac{7}{2}$ only

(D) $t = 3$ and $t = \frac{7}{2}$

(E) $t = 3$ and $t = 4$

$x'(t) = 6t^2 - 42t + 72 = 0$

$t^2 - 7t + 12 = 0$

$(t-3)(t-4) = 0$

$t = 3 \quad t = 4$

B

26. What is the slope of the line tangent to the curve $3y^2 - 2x^2 = 6 - 2xy$ at the point $(3, 2)$?

(A) 0 (B) $\frac{4}{9}$ (C) $\frac{7}{9}$ (D) $\frac{6}{7}$ (E) $\frac{5}{3}$

$f(1) = 2$

B

27. Let f be the function defined by $f(x) = x^3 + x$. If $g(x) = f^{-1}(x)$ and $g(2) = 1$, what is the value of $g'(2)$?

(A) $\frac{1}{13}$ (B) $\frac{1}{4}$ (C) $\frac{7}{4}$ (D) 4 (E) 13

$g'(x) = \frac{1}{f'(g(x))}$

inc cc↑

E

28. Let g be a twice-differentiable function with $g'(x) > 0$ and $g''(x) > 0$ for all real numbers x, such that $g(4) = 12$ and $g(5) = 18$. Of the following, which is a possible value for $g(6)$?

(A) ~~15~~ (B) ~~18~~ (C) ~~21~~ (D) ~~24~~ (E) 27

$g'(2) = \frac{1}{f'(g(2))}$

26) $6y \cdot y' - 4x = -2(x \cdot y' + y \cdot 1)$

$6y \cdot y' - 4x = -2xy' - 2y$

$(6y + 2x)y' = -2y + 4x$

$y' = \frac{-2y + 4x}{6y + 2x}$

$y' = \frac{-2(2) + 4(3)}{6(2) + 2(3)}$

$y' = \frac{-4 + 12}{12 + 6}$

$y' = \frac{8}{18} = \frac{4}{9}$

27) $f'(x) = 3x^2 + 1$

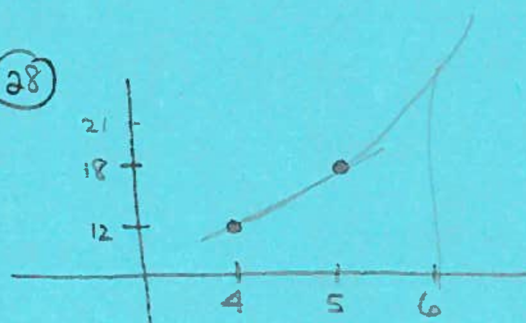
$f'(1) = 3(1^2) + 1$

$f'(1) = 4$

$= \frac{1}{f'(1)}$

$= \frac{1}{4}$

28)



$m_{4-5} = \frac{6}{1} \quad m_{5-6} = \frac{24 - 18}{1} = 6$

$\frac{27 - 18}{1} = 9$

CALCULUS AB
SECTION I, Part B
Time—50 minutes
Number of questions—17

A GRAPHING CALCULATOR IS REQUIRED FOR SOME QUESTIONS ON THIS PART OF THE EXAMINATION.

Directions: Solve each of the following problems, using the available space for scratchwork. After examining the form of the choices, decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the test book. Do not spend too much time on any one problem.

BE SURE YOU ARE USING PAGE 3 OF THE ANSWER SHEET TO RECORD YOUR ANSWERS TO QUESTIONS NUMBERED 76-92.

YOU MAY NOT RETURN TO PAGE 2 OF THE ANSWER SHEET.

In this test:

(1) The exact numerical value of the correct answer does not always appear among the choices given. When this happens, select from among the choices the number that best approximates the exact numerical value.

(2) Unless otherwise specified, the domain of a function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

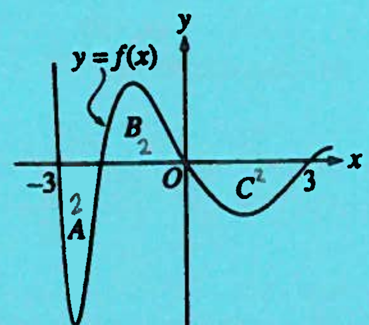
(3) The inverse of a trigonometric function f may be indicated using the inverse function notation f^{-1} or with the prefix "arc" (e.g., $\sin^{-1} x = \arcsin x$).

C

76. A particle moves along the x-axis so that at any time $t \geq 0$, its velocity is given by $v(t) = 3 + 4.1\cos(0.9t)$. What is the acceleration of the particle at time $t = 4$?

(A) -2.016 (B) -0.677 (C) 1.633 (D) 1.814 (E) 2.978

$a'(4) = 1.633$



C

77. The regions A, B, and C in the figure above are bounded by the graph of the function f and the x-axis. If the area of each region is 2, what is the value of $\int_{-3}^{3} (f(x) + 1)\,dx$? $= \int_{-3}^{3} f(x)\,dx + \int_{-3}^{3} 1\,dx$

(A) -2 (B) -1 (C) 4 (D) 7 (E) 12

$-2 + 6 = 4$

C

78. The radius of a circle is increasing at a constant rate of 0.2 meters per second. What is the rate of increase in the area of the circle at the instant when the circumference of the circle is 20π meters? πr^2

(A) $0.04\pi \text{ m}^2/\text{sec}$

(B) $0.4\pi \text{ m}^2/\text{sec}$

(C) $4\pi \text{ m}^2/\text{sec}$

(D) $20\pi \text{ m}^2/\text{sec}$

(E) $100\pi \text{ m}^2/\text{sec}$

$\frac{dr}{dt} = 0.2 \text{ m/s}$

$C = 20\pi$

$\frac{dC}{dt} = ?$ $r = 10$

$dA/dt = ?$

$C = 2\pi r$

$\frac{dC}{dt} = 2\pi \frac{dr}{dt}$

$\frac{dC}{dt} = 2\pi(.2)$

$\frac{dC}{dt} = .4\pi \frac{m}{s}$

$\frac{dA}{dt} = 2\pi r \frac{dr}{dt}$

$\frac{dA}{dt} = 2\pi(10)(.2)$

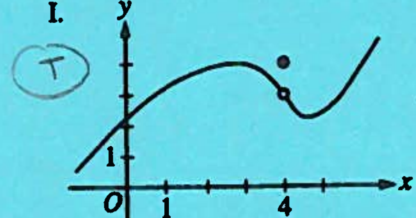
$\frac{dA}{dt} = (.4)(10)\pi$

$= 4\pi \text{ m}^2/\text{sec}$

79. For which of the following does $\lim_{x \to 4} f(x)$ exist?

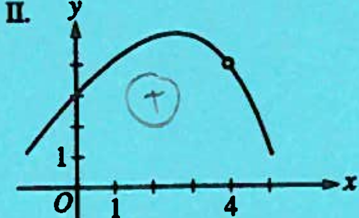
D

I.



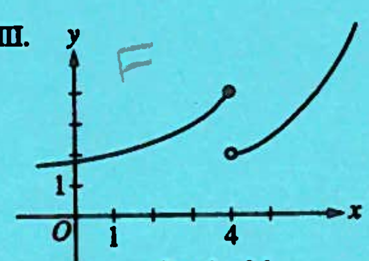
Graph of f

II.



Graph of f

III.



Graph of f

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) I and III only

B

80. The function f is continuous for $-2 \le x \le 1$ and differentiable for $-2 < x < 1$. If $f(-2) = -5$ and $f(1) = 4$, which of the following statements could be false?

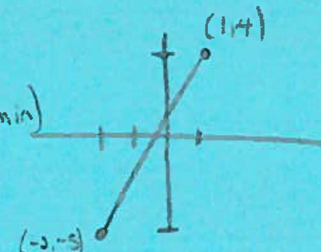
(A) There exists c, where $-2 < c < 1$, such that $f(c) = 0$.

(B) There exists c, where $-2 < c < 1$, such that $f'(c) = 0$. (no max/min)

(C) There exists c, where $-2 < c < 1$, such that $f(c) = 3$.

(D) There exists c, where $-2 < c < 1$, such that $f'(c) = 3$.

(E) There exists c, where $-2 \le c \le 1$, such that $f(c) \ge f(x)$ for all x on the closed interval $-2 \le x \le 1$.



D

81. Let f be the function with derivative given by $f'(x) = \sin(x^2 + 1)$. How many relative extrema does f have on the interval $2 < x < 4$?

$f'(x) = 0$

(A) One (B) Two (C) Three (D) Four (E) Five

A

82. The rate of change of the altitude of a hot-air balloon is given by $r(t) = t^3 - 4t^2 + 6$ for $0 \le t \le 8$. Which of the following expressions gives the change in altitude of the balloon during the time the altitude is decreasing?

derivative

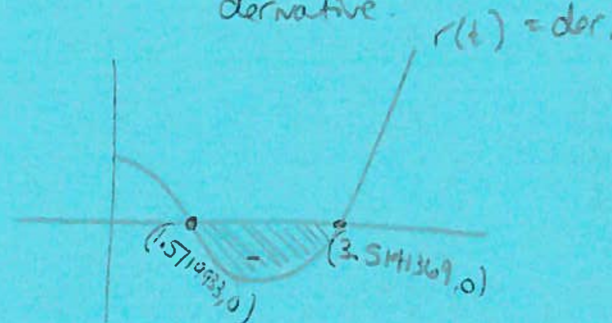
(A) $\int_{1.572}^{3.514} r(t)\,dt$ derivative

(B) $\int_0^8 r(t)\,dt$

(C) $\int_0^{2.667} r(t)\,dt$

(D) $\int_{1.572}^{3.514} r'(t)\,dt$ 2nd derivative

(E) $\int_0^{2.667} r'(t)\,dt$



A

83. The velocity, in ft/sec, of a particle moving along the x-axis is given by the function $v(t) = e^t + te^t$. What is the average velocity of the particle from time $t = 0$ to time $t = 3$?

(A) 20.086 ft/sec

(B) 26.447 ft/sec

(C) 32.809 ft/sec

(D) 40.671 ft/sec

(E) 79.342 ft/sec

$\frac{1}{3}\int_0^3 v(t)\,dt = \frac{1}{3}(60.256611)$

A

84. A pizza, heated to a temperature of 350 degrees Fahrenheit (°F), is taken out of an oven and placed in a 75°F room at time $t = 0$ minutes. The temperature of the pizza is changing at a rate of $-110e^{-0.4t}$ degrees Fahrenheit per minute. To the nearest degree, what is the temperature of the pizza at time $t = 5$ minutes?

(A) 112°F (B) 119°F (C) 147°F (D) 238°F (E) 335°F

$t = 5 \quad F = ?$

$\int dF/dt = \int -110e^{-.4t}\,dt$

C = ambient room temp.

$F = 275e^{-.4(5)} + 75$

$F = \frac{-110}{-.4} e^{-.4t} + C$

$\boxed{F = 275e^{-.4t} + 75}$

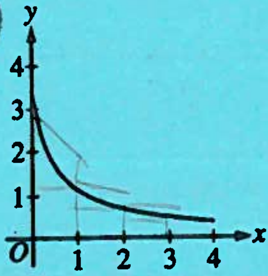
$F(5) = 112.217°F$

$F = 275e^{-.4t} + C$

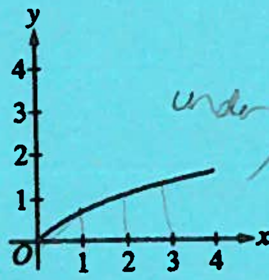
A

85. If a trapezoidal sum overapproximates $\int_0^4 f(x)\,dx$, and a right Riemann sum underapproximates $\int_0^4 f(x)\,dx$, which of the following could be the graph of $y = f(x)$?

(A)

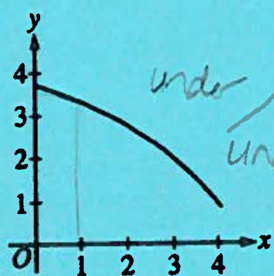


(B)



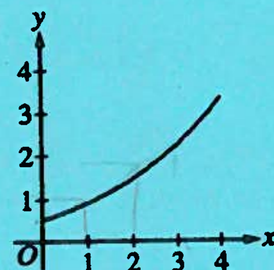
under / over

(C)



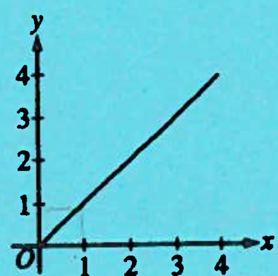
under / under

(D)



Over
Over

(E)



exact / over

B

86. The base of a solid is the region in the first quadrant bounded by the y-axis, the graph of $y = \tan^{-1} x$, the horizontal line $y = 3$, and the vertical line $x = 1$. For this solid, each cross section perpendicular to the x-axis is a square. What is the volume of the solid?

(A) 2.561 (B) 6.612 (C) 8.046 (D) 8.755 (E) 20.773

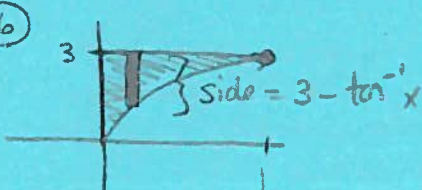
B

87. The function f has first derivative given by $f'(x) = \dfrac{\sqrt{x}}{1 + x + x^3}$. What is the x-coordinate of the inflection point of the graph of f ?

where f' has max/min.

(A) 1.008 (B) 0.473 (C) 0 (D) -0.278 (E) The graph of f has no inflection point.

(86)



$\int_0^1 (3-\arctan x)^2\,dx$

$= 6.612$

3-arctan x

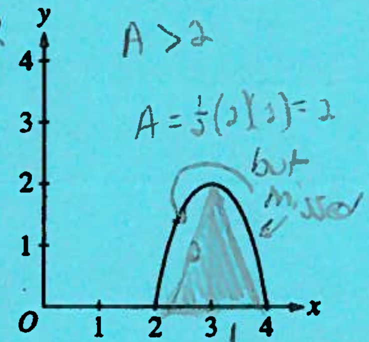
3-arctan x

$A = (3-\arctan x)^2$

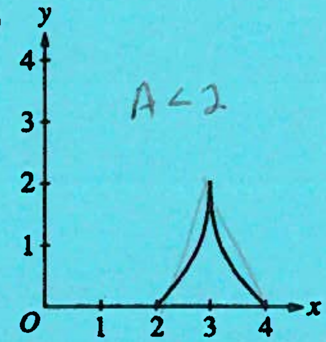
88. On the closed interval [2, 4], which of the following could be the graph of a function f with the property that $\frac{1}{4-2}\int_2^4 f(t)\,dt = 1$?

C

(A)



(B)

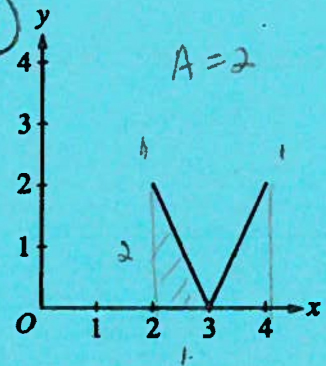


$$\frac{1}{2}\int_2^4 f(t)\,dt = 1$$

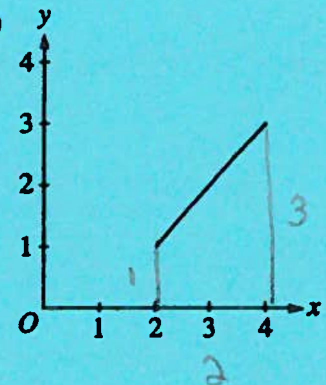
$$\int_2^4 f(t)\,dt = 2$$

area from 2 → 4 = 2.

(C)

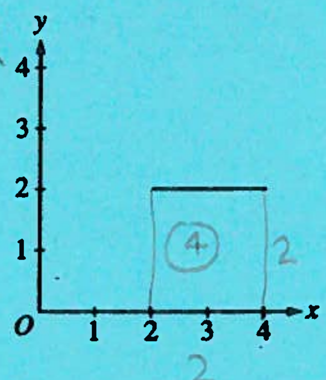


(D)



$A = \frac{1}{2}(2)(1+3) = 4$

(E)



decreasing

89. Let f be a differentiable function with $f(2) = 3$ and $f'(2) = -5$, and let g be the function defined by $g(x) = xf(x)$. Which of the following is an equation of the line tangent to the graph of g at the point where $x = 2$?

D

(A) $y = 3x$

(B) $y - 3 = -5(x - 2)$

(C) $y - 6 = -5(x - 2)$

(D) $y - 6 = -7(x - 2)$

(E) $y - 6 = -10(x - 2)$

$g'(x) = x \cdot f'(x) + f(x) \cdot 1$

$g'(2) = 2 \cdot f'(2) + f(2)$

$g'(2) = 2(-5) + 3 = -7$ ← slope.

inc ccd

B 90. For all x in the closed interval $[2, 5]$, the function f has a positive first derivative and a negative second derivative. Which of the following could be a table of values for f?

(A)

x	$f(x)$
2	7
3	9
4	12
5	16

>2 >3 >4

(B)

x	$f(x)$
2	7
3	11
4	14
5	16

>4 >3 >2

~~(C)~~

x	$f(x)$
2	16
3	12
4	9
5	7

~~(D)~~

x	$f(x)$
2	16
3	14
4	11
5	7

~~(E)~~

x	$f(x)$
2	16
3	13
4	10
5	7

E 91. A particle moves along the x-axis so that at any time $t > 0$, its acceleration is given by $a(t) = \ln(1 + 2^t)$. If the velocity of the particle is 2 at time $t = 1$, then the velocity of the particle at time $t = 2$ is

(A) 0.462 (B) 1.609 (C) 2.555 (D) 2.886 (E) 3.346

D 92. Let g be the function given by $g(x) = \int_0^x \sin(t^2)\,dt$ for $-1 \le x \le 3$. On which of the following intervals is g decreasing?

(A) $-1 \le x \le 0$

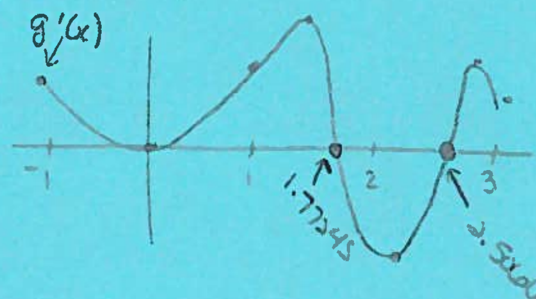
(B) $0 \le x \le 1.772$

(C) $1.253 \le x \le 2.171$

(D) $1.772 \le x \le 2.507$

(E) $2.802 \le x \le 3$

$g'(x) = \sin x^2$



(91)

$$\int_1^2 a(t)\,dt = v(2) - v(1)$$

$$= v(2) - 2$$

$$2 + \int_1^2 a(t)\,dt = v(2)$$

$$v(2) = 3.346$$