Calculus Course

Calculus Course

Full Name: _____

Period _____

Date: _____

Multiple Choice Test # 5

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43. A B C D E
44. A B C D E
45. A B C D E

★All work must be organized for Credit.

Multiple Choice
Test #5

CALCULUS AB

Which of the following define a function f for which $f(-x) = -f(x)$?

(a) $f(x) = x^2$ (b) $f(x) = \sin x$ (c) $f(x) = \cos x$

(d) $f(x) = \log x$ (e) $f(x) = e^x$

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(2) $\ln (x - 2) < 0$ if and only if

(a) $x < 3$ (b) $0 < x < 3$ (c) $2 < x < 3$ (d) $x > 2$

(e) $x > 3$

---

(3) If $\begin{cases} f(x) = \dfrac{\sqrt{2x + 5} - \sqrt{x + 7}}{x - 2}, & \text{for } x \neq 2, \\ f(2) = k \end{cases}$

and if f is continuous at $x = 2$, then $k =$

(a) 0 (b) $\frac{1}{6}$ (c) $\frac{1}{3}$ (d) 1 (e) $\frac{7}{5}$

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(4) $\displaystyle\int_0^8 \frac{dx}{\sqrt{1 + x}} =$

(a) 1 (b) $\frac{3}{2}$ (c) 2 (d) 4 (e) 6

---

(5) If $3x^2 + 2xy + y^2 = 2$, then the value of $\frac{dy}{dx}$ at $x = 1$ is

(a) -2 (b) 0 (c) 2 (d) 4 (e) not defined

---

(6) What is $\lim\limits_{h \to 0} \dfrac{8\left(\frac{1}{2} + h\right)^8 - 8\left(\frac{1}{2}\right)^8}{h}$?

(a) 0 (b) $\frac{1}{2}$ (c) 1 (d) The limit does not exist.

(e) It cannot be determined from the information given.

(7) For what value of k will $x + \frac{k}{x}$ have a relative maximum at $x = -2$?

(a) -4 (b) -2 (c) 2 (d) 4 (e) None of these

---

(8) If $p(x) = (x + 2)(x + k)$ and if the remainder is 12 when $p(x)$ is divided by $x - 1$, then $k =$

(a) 2 (b) 3 (c) 6 (d) 11 (e) 13

---

(9) When the area in square units of an expanding circle is increasing twice as fast as its radius in linear units, the radius is

(a) $\frac{1}{4\pi}$ (b) $\frac{1}{4}$ (c) $\frac{1}{\pi}$ (d) 1 (e) π

---

(10) The set of all points (e^t, t), where t is a real number, the the graph of

(a) $\frac{1}{e^x}$ (b) $e^{1/x}$ (c) $xe^{1/x}$ (d) $\frac{1}{\ln x}$ (e) $\ln x$

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(11) The point on the curve $x^2 + 2y = 0$ that is nearest the point $(0, -\frac{1}{2})$ occurs where y is

(a) $\frac{1}{2}$ (b) 0 (c) $-\frac{1}{2}$ (d) -1 (e) None of the above

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(12) If $f(x) = \frac{4}{x - 1}$ and $g(x) = 2x$, then the solution set of $f(g(x)) = g(f(x))$ is

(a) $\left\{\frac{1}{3}\right\}$ (b) $\{2\}$ (c) $\{3\}$ (d) $\{-1, 2\}$ (e) $\left\{\frac{1}{3}, 2\right\}$

---

(13) The region bounded by the X-axis and the part of the graph of $y = \cos x$ between $x = -\frac{\pi}{2}$ and $x = \frac{\pi}{2}$ is separated into two regions by the line $x = k$. If the area of the region for $-\frac{\pi}{2} \leq x \leq k$ is three times the area of the region for $k \leq x \leq \frac{\pi}{2}$, then $k =$

(a) ar c sin $\frac{1}{4}$ (b) ar c sin $\frac{1}{3}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{4}$

(e) $\frac{\pi}{3}$

---

(14) If the function f is defined by $f(x) = x^5 - 1$, then f^{-1}, the inverse function of f, is defined by $f^{-1}(x) =$

(a) $\frac{1}{\sqrt[5]{x} + 1}$ (b) $\frac{1}{\sqrt[5]{x + 1}}$ (c) $\sqrt[5]{x - 1}$ (d) $\sqrt[5]{x} - 1$

(e) $\sqrt[5]{x + 1}$

(15) If $f'(x)$ and $g'(x)$ exist and $f'(x) > g'(x)$ for all real x, then the graph of $y = f(x)$ and the graph of $y = g(x)$

(a) intersect exactly once
(b) intersect no more than once
(c) do not intersect
(d) could intersect more than once
(e) have a common tangent at each point of intersection

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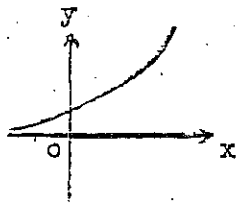
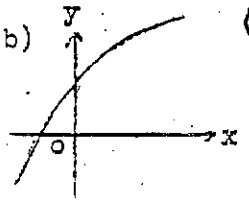
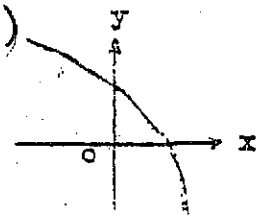
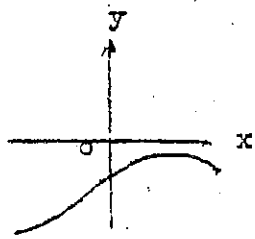
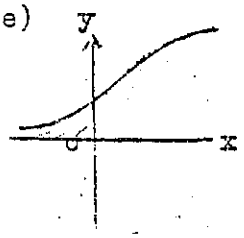
(16) If y is a function of x such that $y' > 0$ for all x and $y'' < 0$ for all x, which of the following could be part of the graph of $y = f(x)$?

(a) 

(b) 

(c) 

(d) 

(e) 

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(17) The graph of $y = 5x^4 - x^5$ has a point of inflection at

(a) (0,0) only (b) (3,162) only (c) (4, 256) only

(d) (0,0) and (3,162) (e) (0, 0) and (4, 256)

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(18) If $f(x) = 2 + |x - 3|$ for all x, then the value of the derivative $f'(x)$ at $x = 3$ is

(a) -1 (b) 0 (c) 1 (d) 2 (e) nonexistent

---

(19) A point moves on the X-axis in such a way that its velocity at time $t (t > 0)$ is given by $v = \frac{\ln t}{t}$.

At what value of t does v attain its maximum?

(a) 1 (b) $e^{\frac{1}{2}}$ (c) e (d) $e^{\frac{3}{2}}$ (e) There is no maximum value for v.

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(20) An equation for a tangent to the graph of $y = \arcsin \frac{x}{2}$ at the origin is

(a) $x - 2y = 0$ (b) $x - y = 0$ (c) $x = 0$ (d) $y = 0$

(e) $x - 2y = 0$

(21) At $x = 0$, which of the following is true of the function f defined by $f(x) = x^2 + e^{-2x}$?

(a) f is increasing.
(b) f is decreasing.
(c) f is discontinuous.
(d) f has a relative minimum
(e) f has a relative maximum

---

(22) $\frac{d}{dx}(\ln e^{2x}) =$

(a) $\frac{1}{e^{2x}}$ (b) $\frac{2}{e^{2x}}$ (c) $2x$ (d) 1 (e) 2

---

(23) The area of the region bounded by the curve $y = e^{2x}$, the X-axis, the Y-axis, and the line $x = 2$ is equal to

(a) $\frac{e^4}{2} - e$ (b) $\frac{e^4}{2} - 1$ (c) $\frac{e^4}{2} - \frac{1}{2}$ (d) $2e^4 - e$

(e) $2e^4 - 2$

---

(24) If $\sin x = e^y$, $0 < x < \pi$, what is $\frac{dy}{dx}$ in terms of x?

(a) $-\tan x$ (b) $-\cot x$ (c) $\cot x$ (d) $\tan x$

(e) $\csc x$

---

(25) A region in the plane is bounded by the graph of $y = \frac{1}{x}$, the X-axis, the line $x = m$, and the line $x = 2m$, $m > 0$. The area of this region

(a) is independent of m
(b) increases as m increases
(c) decreases as m increases
(d) decreases as m increases when $m < \frac{1}{2}$; increases as m increase when $m > \frac{1}{2}$
(e) increases as m increases when $m < \frac{1}{2}$; decreases as m increases when $m > \frac{1}{2}$

---

(26) $\int_0^1 \sqrt{x^2 - 2x + 1}\, dx$ is

(a) -1 (b) $-\frac{1}{2}$ (c) $\frac{1}{2}$ (d) 1 (e) none of the above

(27) If $\frac{dy}{dx} = \tan x$, then $y =$

(a) $\frac{1}{2}\tan^2 x + C$ (b) $\sec^2 x + C$ (c) $\ln|\sec x| + C$

(d) $\ln|\cos x| + C$ (e) $\sec x \tan x + c$

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(28) The function defined by $f(x) = \sqrt{3}\cos x + 3\sin x$ has an amplitude of

(a) $3 - \sqrt{3}$ (b) $\sqrt{3}$ (c) $2\sqrt{3}$ (d) $3 + \sqrt{3}$

(e) $3\sqrt{3}$

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(29) $\int_{\pi/4}^{\pi/2} \frac{\cos x}{\sin x} dx =$

(a) $\ln\sqrt{2}$ (b) $\ln\frac{\pi}{4}$ (c) $\ln\sqrt{3}$ (d) $\ln\frac{\sqrt{3}}{2}$

---

(30) If a function of f is continuous for all x and if f has a relative maximum at $(-1,4)$ and a relative minimum at $(3,-2)$, which of the following statements must be true?

(a) The graph of f has a point of inflection somewhere between $x = -1$ and $x = 3$
(b) $f'(-1) = 0$
(c) The graph of f has a horizontal asymptote.
(d) The graph of f has a horizontal tangent line at $x = 3$.
(e) The graph of f intersects both axes.

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(31) if $f'(x) = -f(x)$ and $f(1) = 1$, then $f(x) =$

(a) $\frac{1}{2}e^{-2x+2}$ (b) e^{-x-1} (c) e^{1-x} (d) e^{-x} (e) $-e^x$

---

(32) If a, b, c, d, and e are real numbers and $a \neq 0$. then the polynomial equation

$ax^7 + bx^5 + cx^3 + dx + e = 0$ has

(a) only one real root (b) at least one real root
(c) and odd number of nonreal roots (d) no real roots
(e) no positive real roots

---

(33) What is the average value of $3t^3 - t^2$ over the interval $-1 \leq t \leq 2$?

(a) $\frac{11}{4}$ (b) $\frac{7}{2}$ (c) 8 (d) $\frac{33}{4}$ (e) 16

(34) Which of the following is an equation of a curve that intersects at right angles every curve of the family $y = \frac{1}{x} + k$ (where k takes all real values)?

(a) $y = -x$ (b) $y = -x^2$ (c) $y = -\frac{1}{3}x^3$ (d) $y = \frac{1}{3}x^3$

(e) $y = \ln x$

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(35) At $t = 0$ a particle starts at rest and moves along a line in such a way that at time t its acceleration is $24t^2$ feet per second per second. Through how many feet does the particle move during the first 2 seconds?

(a) 32 (b) 48 (c) 64 (d) 96 (e) 192

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(36) The approximate value of $y = \sqrt{4 + \sin x}$ at $x = 0.12$, obtained from the tangent to the graph at $x = 0$, is

(a) 2.00 (b) 2.03 (c) 2.06 (d) 2.12 (e) 2.24

---

(37) Which is the best of the following polynomial approximations to cos 2x near $x = 0$?

(a) $1 + \frac{x}{2}$ (b) $1 + x$ (c) $1 - \frac{x^2}{2}$ (d) $1 - 2x^2$

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

#38-45 are calculator Friendly

(38.) The velocity , in ft/ sec, of a particle moving along the x-axis is given by $v(t) = e^{t} + t\,e^{2t}$. What is the average velocity of the time $t = 0$ to $t = 1$

A) 3.816 B) 8.675 C) 9.357 D) 12.897 E) 14.896

(39.) The function f has a 1st derivative given by $f'(x) = \dfrac{3\sqrt{x}}{4 + x + x^2}$

What is the x- coordinate of the two inflection points of f?

A) 2.675 B) 1.34 and 2.459
C) 1.986 D) 1.0
E) -1.56 and -.056

(40.) A particle moves along the x-axis so that at any time $t>0$, its acceleration Is given by $a(t) = \ln(3 + 4^{t})$. If the velocity of the particle is 5 at t=2, Then the velocity of the particle at time $t = 3$ is

A) 5.897 B) 6.908 C) 8.562 D) 9.896 E) 9.994

(41.) Let g be the function given by $g(x) = \int_{0}^{x} \cos(t^2)\,dt$ for $-1 < x < 2.5$
On which interval is g decreasing?

A) (-1, 2.3) B) (1.253, 2.171) C) (.675, 1.236)
D) (-.674, 1.896) E) (1.458, 2.096)

(42.) Let f be the function with derivative given by $f'(x) = \cos(x^2 + 1)$
How many relative extrema does f have on the interval $-3 < x < 2$?

A) 4 B) 5 C) 6 D) 7 E) 8

(43.) The radius of a circle is increasing at a constant rate of 0. 5 m/sec
What is the rate of increase in the area of the circle at the instant when
The circumference of the circle is 18π meters?

A) $\dfrac{9\pi}{2}$ m / sec B) 8π m/sec C) $\dfrac{5\pi}{3}$ m/sec

D) $\dfrac{8\pi}{7}$ m/sec E) 9π m/sec

(44) A particle moves along the x-axis so that at any time $t \geq 0$, its velocity is given by $v(t) = 2 - 3.7 \sin(0.7t)$ What is the acceleration of The particle at time $t = 2$?

A) -.440 B) -.276 C) 1.785 D) 2.450 E) 2.674

---

(45) A pizza heated to a temperature of 475° F is taken out of an oven and placed in a 72° F room at time $t = 0$ min. The temperature of the pizza is changing at a rate of

$-140\, e^{-0.3t}$ degrees Fahrenheit per minute. To the nearest degree, what is the temperature of the pizza at time $t = 4$ minutes?

A) 98.674°F B) 108.542°F C) 148.891°F
D) 175.902°F E) 208.761°F
