Calculus Course

Calculus Course

Row #____

Full Name: _____

Period _____

Date: _____

Multiple Choice Test # 3

★ All work must be organized for credit.

01.	A	B	C	D	E	24.	A	B	C	D	E
02.	A	B	C	D	E	25.	A	B	C	D	E
03.	A	B	C	D	E	~~26.~~	~~A~~	~~B~~	~~C~~	~~D~~	~~E~~
04.	A	B	C	D	E	27.	A	B	C	D	E
05.	A	B	C	D	E	28.	A	B	C	D	E
06.	A	B	C	D	E	29.	A	B	C	D	E
07.	A	B	C	D	E	30.	A	B	C	D	E
08.	A	B	C	D	E	31.	A	B	C	D	E
09.	A	B	C	D	E	32.	A	B	C	D	E
10.	A	B	C	D	E	33.	A	B	C	D	E
11	A	B	C	D	E	34.	A	B	C	D	E
~~12.~~	~~A~~	~~B~~	~~C~~	~~D~~	~~E~~	~~35.~~	~~A~~	~~B~~	~~C~~	~~D~~	~~E~~
13.	A	B	C	D	E	~~36.~~	~~A~~	~~B~~	~~C~~	~~D~~	~~E~~
14.	A	B	C	D	E	37.	A	B	C	D	E
15.	A	B	C	D	E	~~38.~~	~~A~~	~~B~~	~~C~~	~~D~~	~~E~~
16.	A	B	C	D	E	39.	A	B	C	D	E
17.	A	B	C	D	E	~~40.~~	~~A~~	~~B~~	~~C~~	~~D~~	~~E~~
18.	A	B	C	D	E	41.	A	B	C	D	E
~~19.~~	~~A~~	~~B~~	~~C~~	~~D~~	~~E~~	42.	A	B	C	D	E
20.	A	B	C	D	E	43.	A	B	C	D	E
~~21.~~	~~A~~	~~B~~	~~C~~	~~D~~	~~E~~	44.	A	B	C	D	E
22.	A	B	C	D	E	45.	A	B	C	D	E
23.	A	B	C	D	E						

Multiple Test #3

CALCULUS AB

1. $\int_1^2 x^{-3}\,dx =$

(A) $-\frac{7}{8}$ (B) $-\frac{3}{4}$ (C) $\frac{15}{64}$ (D) $\frac{3}{8}$ (E) $\frac{15}{16}$

2. If $f(x) = (2x + 1)^4$, then the 4th derivative of $f(x)$ at $x = 0$ is

(A) 0 (B) 24 (C) 48 (D) 240 (E) 384

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

(A) $\frac{-6x}{(4 + x^2)^2}$ (B) $\frac{3x}{(4 + x^2)^2}$ (C) $\frac{6x}{(4 + x^2)^2}$ (D) $\frac{-3}{(4 + x^2)^2}$ (E) $\frac{3}{2x}$

4. If $\frac{dy}{dx} = \cos(2x)$, then $y =$

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

(D) $\frac{1}{2}\sin^2(2x) + C$ (E) $-\frac{1}{2}\sin(2x) + C$

5. $\lim_{n \to \infty} \frac{4n^2}{n^2 + 10{,}000n}$ is

(A) 0 (B) $\frac{1}{2{,}500}$ (C) 1 (D) 4 (E) nonexistent

6. If $f(x) = x$, then $f'(5) =$

(A) 0 (B) $\frac{1}{5}$ (C) 1 (D) 5 (E) $\frac{25}{2}$

(7) Which of the following is equal to $\ln 4$?

(A) $\ln 3 + \ln 1$ (B) $\frac{\ln 8}{\ln 2}$ (C) $\int_1^4 e^t\,dt$ (D) $\int_1^4 \ln x\,dx$ (E) $\int_1^4 \frac{1}{t}\,dt$

(8) The slope of the line tangent to the graph of $y = \ln\left(\frac{x}{2}\right)$ at $x = 4$ is

(A) $\frac{1}{8}$ (B) $\frac{1}{4}$ (C) $\frac{1}{2}$ (D) 1 (E) 4

(9) If $\int_{-1}^{1} e^{-x^2}\,dx = k$, then $\int_{-1}^{0} e^{-x^2}\,dx =$

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

(10) If $y = 10^{(x^2-1)}$, then $\frac{dy}{dx} =$

(A) $(\ln 10)\,10^{(x^2-1)}$ (B) $(2x)\,10^{(x^2-1)}$ (C) $(x^2-1)\,10^{(x^2-2)}$

(D) $2x(\ln 10)\,10^{(x^2-1)}$ (E) $x^2(\ln 10)\,10^{(x^2-1)}$

(11) The position of a particle moving along a straight line at any time t is given by $s(t) = t^2 + 4t - 4$. What is the acceleration of the particle when $t = 4$?

(A) 0 (B) 2 (C) 4 (D) 8 (E) 12

(12) If $f(g(x)) = \ln(x^2 + 4)$, $f(x) = \ln(x^2)$, and $g(x) > 0$ for all real x, then $g(x) =$

(A) $\frac{1}{\sqrt{x^2+4}}$ (B) $\frac{1}{x^2+4}$ (C) $\sqrt{x^2+4}$ (D) $x^2 + 4$ (E) $x + 2$

(13) If $x^2 + xy + y^3 = 0$, then, in terms of x and y, $\frac{dy}{dx} =$

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

(14) The velocity of a particle moving on a line at time t is $v = 3t^{\frac{1}{2}} + 5t^{\frac{3}{2}}$ meters per second. How many meters did the particle travel from $t = 0$ to $t = 4$?

(A) 32 (B) 40 (C) 64 (D) 80 (E) 184

(15) The domain of the function defined by $f(x) = \ln(x^2 - 4)$ is the set of all real numbers x such that

(A) $|x| < 2$ (B) $|x| \leq 2$ (C) $|x| > 2$ (D) $|x| \geq 2$ (E) x is a real number

(16) The function defined by $f(x) = x^3 - 3x^2$ for all real numbers x has a relative maximum at $x =$

(A) -2 (B) 0 (C) 1 (D) 2 (E) 4

(17) $\int_0^1 xe^{-x}\,dx =$

(A) $1 - 2e$ (B) -1 (C) $1 - 2e^{-1}$ (D) 1 (E) $2e - 1$

(18) If $y = \cos^2 x - \sin^2 x$, then $y' =$

(A) -1 (B) 0 (C) $-2\sin(2x)$ (D) $-2(\cos x + \sin x)$ (E) $2(\cos x - \sin x)$

(19) If $f(x_1) + f(x_2) = f(x_1 + x_2)$ for all real numbers x_1 and x_2, which of the following could define f?

(A) $f(x) = x + 1$ (B) $f(x) = 2x$ (C) $f(x) = \frac{1}{x}$ (D) $f(x) = e^x$ (E) $f(x) = x^2$

(20) If $y = \text{Arctan}(\cos x)$, then $\frac{dy}{dx} =$

(A) $\frac{-\sin x}{1 + \cos^2 x}$ (B) $-(\text{Arcsec}(\cos x))^2 \sin x$ (C) $(\text{Arcsec}(\cos x))^2$

(D) $\frac{1}{(\text{Arccos } x)^2 + 1}$ (E) $\frac{1}{1 + \cos^2 x}$

(21) If the domain of the function f given by $f(x) = \frac{1}{1 - x^2}$ is $\{x: |x| > 1\}$, what is the range of f?

(A) $\{x: -\infty < x < -1\}$ (B) $\{x: -\infty < x < 0\}$ (C) $\{x: -\infty < x < 1\}$

(D) $\{x: -1 < x < \infty\}$ (E) $\{x: 0 < x < \infty\}$

(22) $\int_1^2 \frac{x^2 - 1}{x + 1}\,dx =$

(A) $\frac{1}{2}$ (B) 1 (C) 2 (D) $\frac{5}{2}$ (E) $\ln 3$

23. $\frac{d}{dx}\left(\frac{1}{x^3} - \frac{1}{x} + x^2\right)$ at $x = -1$ is

(A) -6 (B) -4 (C) 0 (D) 2 (E) 6

24. If $\int_{-2}^{2} (x^7 + k)\,dx = 16$, then $k =$

(A) -12 (B) -4 (C) 0 (D) 4 (E) 12

25. If $f(x) = e^x$, which of the following is equal to $f'(e)$?

(A) $\lim_{h \to 0} \frac{e^{x+h}}{h}$ (B) $\lim_{h \to 0} \frac{e^{x+h} - e^e}{h}$ (C) $\lim_{h \to 0} \frac{e^{e+h} - e}{h}$

(D) $\lim_{h \to 0} \frac{e^{x+h} - 1}{h}$ (E) $\lim_{h \to 0} \frac{e^{e+h} - e^e}{h}$

26. The graph of $y^2 = x^2 + 9$ is symmetric with respect to which of the following?

I. The x-axis
II. The y-axis
III. The origin

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

27. $\int_0^3 |x - 1|\,dx =$

(A) 0 (B) $\frac{3}{2}$ (C) 2 (D) $\frac{5}{2}$ (E) 6

28. If the position of a particle on the x-axis at time t is $-5t^2$, then the average velocity of the particle for $0 \leq t \leq 3$ is

(A) -45 (B) -30 (C) -15 (D) -10 (E) -5

29. Which of the following functions are continuous for all real numbers x?

I. $y = x^{\frac{2}{3}}$
II. $y = e^x$
III. $y = \tan x$

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

(30) $\int \tan(2x)\,dx =$

(A) $-2\ln|\cos(2x)|+C$ (B) $-\frac{1}{2}\ln|\cos(2x)|+C$ (C) $\frac{1}{2}\ln|\cos(2x)|+C$

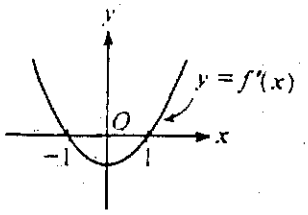
(D) $2\ln|\cos(2x)|+C$ (E) $\frac{1}{2}\sec(2x)\tan(2x)+C$

(31) The volume of a cone of radius r and height h is given by $V=\frac{1}{3}\pi r^2 h$. If the radius and the height both increase at a constant rate of $\frac{1}{2}$ centimeter per second, at what rate, in cubic centimeters per second, is the volume increasing when the height is 9 centimeters and the radius is 6 centimeters?

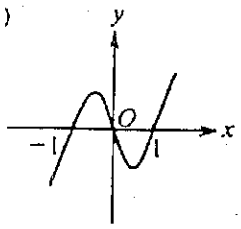
(A) $\frac{1}{2}\pi$ (B) 10π (C) 24π (D) 54π (E) 108π

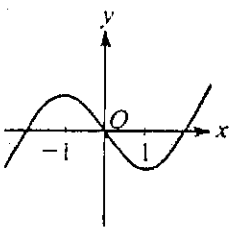
(32) $\int_0^{\frac{\pi}{3}} \sin(3x)dx =$

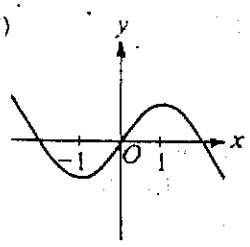
(A) -2 (B) $-\frac{2}{3}$ (C) 0 (D) $\frac{2}{3}$ (E) 2

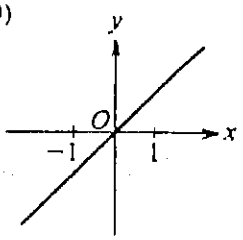


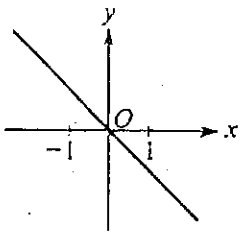
(33) The graph of the derivative of f is shown in the figure above. Which of the following could be the graph of f ?

(A)


(B)


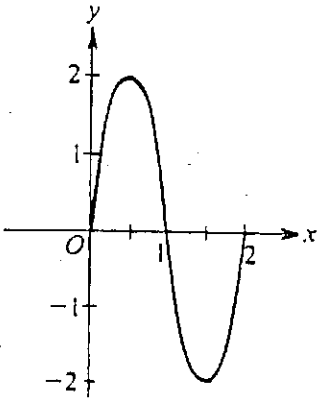
(C)


(D)


(E)


(34) The area of the region in the first quadrant that is enclosed by the graphs of $y = x^3 + 8$ and $y = x + 8$ is

(A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) 1 (E) $\frac{65}{4}$



(35) The figure above shows the graph of a sine function for one complete period. Which of the following is an equation for the graph?

(A) $y = 2\sin\left(\frac{\pi}{2}x\right)$ (B) $y = \sin(\pi x)$ (C) $y = 2\sin(2x)$ (D) $y = 2\sin(\pi x)$ (E) $y = \sin(2x)$

(36) If f is a continuous function defined for all real numbers x and if the maximum value of $f(x)$ is 5 and the minimum value of $f(x)$ is -7, then which of the following must be true?

I. The maximum value of $f(|x|)$ is 5.

II. The maximum value of $|f(x)|$ is 7.

III. The minimum value of $f(|x|)$ is 0.

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

(37) $\lim_{x \to 0} (x \csc x)$ is

(A) $-\infty$ (B) -1 (C) 0 (D) 1 (E) ∞

(38) Let f and g have continuous first and second derivatives everywhere. If $f(x) \leq g(x)$ for all real x, which of the following must be true?

I. $f'(x) \leq g'(x)$ for all real x

II. $f''(x) \leq g''(x)$ for all real x

III. $\int_0^1 f(x)dx \leq \int_0^1 g(x)dx$

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

(39) If $f(x) = \frac{\ln x}{x}$ for $x > 0$, which of the following is true?

(A) f is increasing for all x greater than 0.

(B) f is increasing for all x greater than 1.

(C) f is decreasing for all x between 0 and 1.

(D) f is decreasing for all x between 1 and e.

(E) f is decreasing for all x greater than e.

(40) Let f be a continuous function on the closed interval $[0,2]$. If $2 \leq f(x) \leq 4$, then the greatest possible value of $\int_0^2 f(x)dx$ is

(A) 0 (B) 2 (C) 4 (D) 8 (E) 16

(41) If $\lim_{x \to a} f(x) = L$, where L is a real number, which of the following must be true?

(A) $f'(a)$ exists.

(B) $f(x)$ is continuous at $x = a$.

(C) $f(x)$ is defined at $x = a$.

(D) $f(a) = L$

(E) None of the above

(42) $\frac{d}{dx} \int_2^x \sqrt{1 + t^2}\, dt =$

(A) $\frac{x}{\sqrt{1 + x^2}}$ (B) $\sqrt{1 + x^2} - 5$ (C) $\sqrt{1 + x^2}$ (D) $\frac{x}{\sqrt{1 + x^2}} - \frac{1}{\sqrt{5}}$ (E) $\frac{1}{2\sqrt{1 + x^2}} - \frac{1}{2\sqrt{5}}$

(43) An equation of the line tangent to $y = x^3 + 3x^2 + 2$ at its point of inflection is

(A) $y = -6x - 6$ (B) $y = -3x + 1$ (C) $y = 2x + 10$ (D) $y = 3x - 1$ (E) $y = 4x + 1$

(44) The average value of $f(x) = x^2\sqrt{x^3 + 1}$ on the closed interval $[0,2]$ is

(A) $\frac{26}{9}$ (B) $\frac{13}{3}$ (C) $\frac{26}{3}$ (D) 13 (E) 26

(45) The region enclosed by the graph of $y = x^2$, the line $x = 2$, and the x-axis is revolved about the y-axis. The volume of the solid generated is

(A) 8π (B) $\frac{32}{5}\pi$ (C) $\frac{16}{3}\pi$ (D) 4π (E) $\frac{8}{3}\pi$