CALCULUS INDIVIDUAL TEST

January

NOTA = None of the Above

1. Find the domain of $f(x)=\dfrac{1}{\sqrt{3-2x}}$.

   A. $\left(-\infty,\frac{3}{2}\right)$ B. $\left[\frac{3}{2},\infty\right)$ C. $\left(\frac{3}{2},\infty\right)$

   D. $\left(-\infty,\frac{3}{2}\right)\cup\left(\frac{3}{2},\infty\right)$ E. NOTA

2. Find $\lim\limits_{x\to 3}\sqrt{9-x^2}$.

   A. 0 B. $\sqrt{6}$ C. $3\sqrt{2}$ D. Does not exist E. NOTA

3. Determine the value of c so that f(x) is continuous on the entire real line if

$$f(x)=\begin{cases}x+3, & x\le -1\\ 2x-c, & x>-1\end{cases}$$

   A. –4 B. 4 C. 0 D. –1 E. NOTA

4. Differentiate and simplify: $y=x^4(2x-3)^5\sin x\cos 2x$.

   A. $-40x^3(2x-3)^4\cos x\sin 2x$

   B. $-80x^3(2x-3)^4\cos x\sin 2x$

   C. $-20x^3(2x-3)^4\cos x\sin 4x$

   D. $-40x^3(2x-3)^4\cos x\sin 4x$

   E. NOTA

5. Evaluate $\int(2x^4+3x^2-2x)dx$.

   A. $\frac{3}{8}x^8+C$ B. $8x^3+6x-2+C$ C. $\frac{2}{5}x^5+x^3-x^2+C$

   D. $2x^5+5x^3-5x^2+C$ E. NOTA

6. Find all points of inflection: $f(x)=\frac{1}{12}x^4-2x^2+15$.

A. (2, 0) B. (2, 0), (–2, 0) C. (0, 15)

D. $\left(2,\frac{25}{3}\right),\left(-2,\frac{25}{3}\right)$ E. NOTA

7. A machine is rolling a metal cylinder under pressure. The radius of the cylinder is decreasing at a constant rate of 0.05 inches per second and the volume V is 128π cubic inches. At what rate is the length h changing when the radius r is 1.5 inches? Give answer to nearest thousandth.

A. –75.850 in./sec. B. 56.889 in./sec. C. 3.793 in./sec.
D. –3.793 in./sec. E. NOTA

8. Find the area of the region bounded by the graphs of $f(x)=x^3+x^2-12x$ and $g(x)=-x^2+3x$.

A. $\frac{117}{4}$ B. $\frac{863}{6}$ C. $\frac{256}{3}$ D. $\frac{1375}{6}$ E. NOTA

9. A point moves along the curve $y=2x^2-1$ in such a way that the y value is decreasing at the rate of 2 units per second. At what rate is x changing when $x=-\frac{3}{2}$?

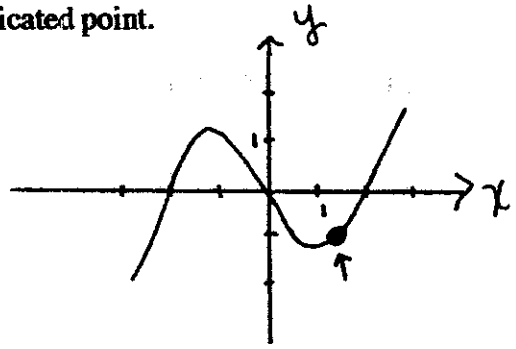
A. Decreasing $\frac{7}{2}$ ur its/sec B. Increasing $\frac{7}{2}$ units/sec

C. Increasing $\frac{1}{3}$ unit/sec D. Decreasing $\frac{1}{3}$ unit/sec

E. NOTA

10. Give the sign of the second derivative of f at the indicated point.

A. Negative
B. Positive
C. Zero
D. The sign cannot be determined
E. NOTA



11. Find $\lim_{x\to 2}\frac{x-2}{x^2-4}$.

A. 0 B. $\frac{1}{4}$ C. ∞ D. 1 E. NOTA

12. Find the point(s) on the graph of the function $f(x)=x^3-2$ where the slope is 3.

A. $(1,3),(-1,3)$ B. $(1,-1),(-1,-3)$ C. $(\sqrt[3]{2},0)$
D. $(1,3)$ E. NOTA

13. Given $f(x)=x^3+x+1$, use Newton's Method to find the iterative formula for x_{n+1}.

A. $x_{n+1}=x_n-\frac{x_n^3+x_n+1}{3x_n^2+1}$ B. $x_{n+1}=-\frac{x_n^3+x_n+1}{3x_n^2+1}$

C. $x_{n+1}=x_n-\frac{3x_n^2+1}{x_n^3+x_n+1}$ D. $x_{n+1}=-\frac{3x_n^2+1}{x_n^3+x_n+1}$ E. NOTA

14. Given $\lim_{x\to 1}(4x-1)=3$, find δ such that $|(4x-1)-3|<0.001$ whenever $0<|x-1|<\delta$.

A. 0.004 B. 0.001 C. 0.00025 D. 1 E. NOTA

15. Which of the following statements is true of $f(x)=-x^3+9x^2-24x+18$?

A. f is decreasing on (2,4) B. f is increasing on $(3,\infty)$
C. f is increasing on (2, 4) D. f is decreasing on $(3,\infty)$
E. NOTA

16. Differentiate $y=x^{\sin x}$, $x>0$.

A. $(\cos x)x^{\sin x}$ B. $(-\cos x)x^{\sin x}$ C. $(\sin x)x^{(\sin x-1)}$
D. $x^{\sin x}\left(\frac{\sin x}{x}\right)$ E. NOTA

17. Find the absolute maximum and absolute minimum of f on $(-4, -1]$.

$$f(x) = \frac{x^3 + 8x^2 + 19x + 12}{x + 4}$$

A. Maximum: None Minimum: $(-2, -1)$
B. Maximum: $(1, 1)$ Minimum: $(4, -2)$
C. Maximum: $(1, 1)$ Minimum: $(-2, -1)$
D. Maximum: None Minimum: $(4, -2)$
E. NOTA

18. Evaluate the integral: $\int x\sqrt{3 - 7x^2}\,dx$.

A. $-\frac{1}{21}(3 - 7x^2)^{3/2} + C$
B. $-\frac{4}{21}(3 - 7x^2)^{3/2} + C$
C. $-\frac{1}{14}(3 - 7x^2)^{3/2} + C$
D. $\frac{2}{3}(3 - 7x^2)^{3/2} + C$
E. NOTA

19. The position function for a particular object is $s = -\frac{35}{2}t^2 + 58t + 91$. Which statement is true?

A. The initial velocity is –35.
B. The velocity is constant.
C. The velocity at time t=1 is 23.
D. The acceleration is $-35/2$.
E. NOTA

20. Which of the following functions has a horizontal asymptote at $y = -\frac{1}{2}$?

A. $\frac{x^3}{1 - 2x^3}$
B. $\frac{x}{\sqrt{2x + 1}}$
C. $\frac{2x^2 - 6x + 1}{1 + x^2}$
D. $\frac{x - 1}{2x^2 + 1}$
E. NOTA

21. Use the Trapezoidal Rule to approximate $\int_2^3 \frac{1}{(x-1)^2}dx$ with n = 4. Give answer to four decimal places.

A. 0.5004 B. 2.5000 C. 0.5090 D. 1.7396 E. NOTA

22. Find $\frac{dy}{dx}$ for $5x^2 - 2xy + 7y^2 = 0$.

A. $\frac{10x + 14y}{2x}$ B. $-\frac{10x - 2y}{14y}$ C. $10x - 2y + 14y$

D. $-\frac{10x - 2y}{-2x + 14y}$ E. NOTA

23. A nursery has determined that the demand in June for potted plants is $p = 2.00 - \frac{x}{43{,}000}$. The cost of growing x plants is $C = 2{,}000 + 0.20x$, $0 \le x \le 100{,}000$. Find the marginal profit.

A. $1.8 - \frac{x}{21{,}500}$ B. $1.8x - \frac{x}{43{,}000} - 2{,}000$ C. $-\frac{8{,}601}{43{,}000}$

D. $\frac{77{,}399}{43{,}000}$ E. NOTA

24. Differentiate: $f(x) = \frac{x^2 - 4x}{\sqrt{x}}$

A. $\frac{3}{2}x^{1/2} - \frac{2}{x^{1/2}}$ B. $\frac{2x - 4}{\sqrt{x}}$ C. $\frac{2x - 4}{1/(2\sqrt{x})}$

D. $x^{3/2} - 4x^{1/2}$ E. NOTA

25. Given that $f(x) = -x^2 + 12x - 28$ has a relative maximum at $x = 6$, choose the correct statement.

A. The first derivative is negative on the interval $(-\infty, 6)$.
B. The first derivative is positive on the interval $(-\infty, \infty)$.
C. The first derivative is negative on the interval $(6, \infty)$.
D. The first derivative is positive on the interval $(6, \infty)$.
E. NOTA

26. Find the arc length of the graph of $f(x)=\left(\frac{2}{3}\right)(x-2)^{3/2}$ on the interval [2, 4].

A. 6 B. $\frac{2}{3}\left[(3)^{3/2}-1\right]$ C. $6+\frac{2}{3}(2)^{3/2}$

D. $\frac{2}{3}(2)^{3/2}$ E. NOTA

27. For $f(x)=\left(x^{3/2}+x\right)^3$, find $f'(4)$.

A. 108 B. 324 C. 36
D. 216 E. NOTA

28. Find the equation of the tangent line to the graph of $f(x)=\sin x$ at $x=\frac{\pi}{4}$.

A. $y=\cos x\left(x-\frac{\pi}{4}\right)$ B. $y-\frac{\sqrt{2}}{2}=\cos x\left(x-\frac{\pi}{4}\right)$ C. $y-\frac{\sqrt{2}}{2}=-\frac{\sqrt{2}}{2}\left(x-\frac{\pi}{4}\right)$

D. $y-\frac{\sqrt{2}}{2}=\frac{\sqrt{2}}{2}\left(x-\frac{\pi}{4}\right)$ E. NOTA

29. Two motorcycles are approaching each other at night on a straight, two-lane highway. Each vehicle is traveling in the center of its lane, and the centers of the lanes are 10 yards apart. The westbound cycle is traveling at 25 yds/s. The eastbound cycle is traveling at a rate of 30 yds/s, and its headlight cast a shadow of the second cycle onto a fence, 20 yds. from the center of the westbound lane. How fast is the shadow of the westbound cycle moving on the fence?

A. 5 yd/s B. –5 yd/s C. –135 yd/s D. 135 yd/s
E. NOTA

30. A farmer has 160 ft. of fencing to enclose 2 adjacent rectangular pig pens that are the same size and have one common side. What dimensions should be used for each pig pen so that the enclosed area will be a maximum?

A. $4\sqrt{15}$ ft. by $\frac{8}{5}\sqrt{15}$ ft. B. 40 ft. by $\frac{80}{3}$ ft. C. 20 ft. by $\frac{80}{3}$ ft.

D. 40 ft. by 40 ft. E. NOTA