

SCORE SHEET

NAME _____

1:		5:		9:		13:		17:	
2:		6:		10:		14:		18:	
3:		7:		11:		15:		19:	
4:		8:		12:		16:		20:	

1. The graph of the function $y = \frac{10x + 3}{2x - 5}$ has a horizontal asymptote at:
- (A) $y = 5$ (B) $y = \frac{3}{5}$ (C) $y = -\frac{3}{5}$ (D) $y = -5$ (E) $y = 0$
2. $\lim_{x \rightarrow 6} 7 =$
- (A) 1 (B) -1 (C) 7 (D) Does not exist (E) -7
3. $\lim_{x \rightarrow 3} \frac{x}{x - 3} =$
- (A) 1 (B) 0 (C) $+\infty$ (D) Does not exist (E) $-\infty$
4. **TRUE or FALSE:** The equation $f(x) = x^3 + x - 3 = 0$ has at least one solution on the interval $[1, 2]$.
5. **TRUE or FALSE:** $\lim_{x \rightarrow 0} \frac{1 - \cos x}{\sin x} = 0$

6. Find the equation of the tangent line to the curve $y = 2x$ at $x = 3$.

(A) $y = 2x$ (B) $y = 2x - 3$ (C) $y = 2x + 3$ (D) $y = 2$ (E) $y = 3$

7. Find $\frac{dy}{dx}$ if $y = e^8$.

(A) $7e^7$ (B) $8e^7$ (C) -8 (D) 8 (E) 0

8. Suppose that $g(x) = \sqrt{x}f(x)$. Find $g'(1)$, given that $f(1) = 8$ and $f'(1) = 5$.

(A) 5 (B) 4 (C) 9 (D) 13 (E) 0

9. Find $f'(x)$ if $f(x) = x^3 \cos x$.

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

10. TRUE or FALSE: $\frac{d^{71}}{dx^{71}}(\sin x) = \cos x$.

11. Find $\frac{dV}{dt}$ for a spherical balloon of radius 2 ft if $\frac{dr}{dt} = 0.5 \frac{\text{ft}}{\text{s}}$. (Recall that the volume of a sphere is given by $V = \frac{4}{3}\pi r^3$.)

- (A) $\frac{16\pi}{3} \frac{\text{ft}^3}{\text{s}}$ (B) $\frac{32\pi}{3} \frac{\text{ft}^3}{\text{s}}$ (C) $8\pi \frac{\text{ft}^3}{\text{s}}$ (D) $4\pi \frac{\text{ft}^3}{\text{s}}$ (E) $2\pi \frac{\text{ft}^3}{\text{s}}$

12. Find $\frac{dy}{dx}$ if $y = \ln(4x^2)$.

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

13. Find $\frac{dy}{dx}$ if $x^3 + 3y^2 = 9$.

- (A) $\frac{9 - 3x^2}{6y}$ (B) $-\frac{x^2}{2y}$ (C) $\frac{x^2}{2y}$ (D) $\frac{9 + 3x^2}{6y}$ (E) $3x^2$

15. The largest interval on which $f(x) = x^2 + 4x + 2$ is increasing is

- (A) $[0, +\infty)$ (B) $(-\infty, 0]$ (C) $[-2, +\infty)$ (D) $(-\infty, -2]$ (E) $(-\infty, +\infty)$

16. TRUE or FALSE: The function $f(x) = \sqrt{x - 6}$ is concave down on its entire domain.

17. Where is the function $f(x) = \cos x$ increasing on the interval $[0, 2\pi]$?

- (A) $[0, \pi]$ (B) $[\pi, 2\pi]$ (C) $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$

(D) $\left[0, \frac{\pi}{2}\right] \cup \left[\frac{3\pi}{2}, 2\pi\right]$ (E) $[0, 2\pi]$

- 18.** The weekly profit function for a certain company is

$$P(x) = -\frac{1}{10}x^2 + 30x - 500$$

where x is the number of the company's product that is made and sold. How many individual items of the product must the company make and sell weekly in order to maximize its profit?

- 19.** The function $f(x) = \frac{1}{x}$ has an absolute maximum on the interval $[1, 3]$ of

- 20. TRUE or FALSE:** The hypotheses of the Mean Value Theorem are satisfied for the function $f(x) = \frac{1}{x^8} - 1$ on the interval $[-1, 1]$.