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 $y = \dfrac{10x+3}{2x-5}$ has a horizontal asymptote at:

(A) $y = 5$ **(B)** $y = \dfrac{3}{5}$ **(C)** $y = -\dfrac{3}{5}$ **(D)** $y = -5$ **(E)** $y = 0$

2. $\lim\limits_{x \to 6} 7 =$

(A) 1 **(B)** -1 **(C)** 7 **(D)** Does not exist **(E)** -7

3. $\lim\limits_{x \to 3} \dfrac{x}{x-3} =$

(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**: $\lim\limits_{x \to 0} \dfrac{1 - \cos x}{\sin x} = 0$

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 $\dfrac{dy}{dx}$ 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**: $\dfrac{d^{71}}{dx^{71}}(\sin x) = \cos x$.

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

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

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

(A) $\dfrac{1}{x}$ **(B)** $\dfrac{2}{x^2}$ **(C)** $\dfrac{1}{2x^2}$ **(D)** $\dfrac{1}{x^2}$ **(E)** $\dfrac{2}{x}$

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

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

14. $\lim_{x \to +\infty} \frac{\ln x}{e^x} =$

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

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

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

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?

(A) 300 **(B)** 50 **(C)** 500 **(D)** 150 **(E)** 200

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

(A) 1 **(B)** $\dfrac{1}{9}$ **(C)** 9

(D) $\dfrac{1}{3}$ **(E)** No absolute maximum exists

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