Name_____   Date_____

1. Find the values of x that satisfy the inequality $0 \le x + 7 \le 12$.

Answer: _____

2. Rationalize the denominator of the expression $\sqrt{\dfrac{5x}{3y}}$.

Answer: _____

3. Solve the following equation $2x^2 - 3x - 9 = 0$.

Answer: _____

4. Use the quadratic formula to solve $2x^2 - 5x - 4 = 0$.

Answer: _____

5. Simplify the expression $\dfrac{4x^2 + 16x + 15}{6x^2 + 9x}$.

Answer: _____

6. **Find an equation of the line (slope-intercept form) that passes through the points $(4,-1)$ and $(-2,4)$.**

Answer: _____

7. **Determine the domain of the function** $f(x) = \dfrac{x}{3x-5}$.

Answer: _____

8. **Let** $f(x) = 3\sqrt{2x}+1$ **and** $g(x) = x^2 - 2$. **Find the rule for the composite function** $f \circ g$.

Answer: _____

9. **Find the value of** $\displaystyle\lim_{x \to -2} \dfrac{x+8}{x-1}$.   Answer: _____

10. **Find the value of** $\displaystyle\lim_{x \to 0} \dfrac{x^2+6x}{x}$, **if it exists.**

Answer: _____

11. Find the value of $\lim\limits_{x \to 3^-} \dfrac{4-x}{x+3}$, if it exists.

Answer: _____

12. A ball is thrown straight up into the air so that its height in feet after t seconds is given by $s(t) = 128t - 16t^2$.

    a. Find the average velocity of the ball during the time interval [3,3.1].

Answer: _____

    b. Find the instantaneous velocity of the ball at $t = 3$ seconds.

Answer: _____

13. Let $f(x) = \dfrac{1}{2}x^2 + 3x$.

    a. Find the slope of the tangent line to the graph of $y = f(x)$ at $x = 2$.

Answer: _____

    b. Find the equation of the tangent line to the graph of $y = f(x)$ at $x = 2$.

Answer: _____

14. Find the derivative of the function $f(x) = \frac{1}{8}x + 1$.

Answer: _____

15. Find the derivative of the function $f(x) = \sqrt{x} - \frac{1}{x}$.

Answer: _____

16. Find the derivative of the function $f(x) = \frac{4x^3}{x^2 + 1}$.

Answer: _____

17. Find the derivative of the function $f(x) = \sqrt{x^2 - 4x}$.

Answer: _____

18. Let $f(x) = \frac{1}{4}(x^2 + 2)(2x + 3)$. Find the point(s) on the graph of f where the slope of the tangent line is equal to 10.

Answer: _____

19. Find $\dfrac{dy}{du}$, $\dfrac{du}{dx}$, and $\dfrac{dy}{dx}$ if $y = u^{-5/3}$ and $u = x^3 - 2x + 1$.

Answer: _____

20. Find $F'(3)$ if $F(x) = f(g(x))$ and $f(3) = 2$, $f'(3) = 5$, $f'(4) = 6$, $g(3) = 4$, and $g'(3) = -2$.

Answer: _____

21. Find the differential of the function $f(x) = \dfrac{3}{x-1}$.

Answer: _____

22. Find the interval(s) where $f(x) = x^3 + \dfrac{9}{2}x^2 + 6x - 3$ is increasing and the interval(s) where it is decreasing.

Increasing: _____   Decreasing: _____

23. Find the relative maxima and minima, if any, of $g(x) = 4x - x^4$.

Maxima: _____   Minima: _____

24. Find the relative maxima and minima, if any, of $h(t) = t^{\frac{1}{3}} - 3t$.

Maxima: _____   Minima: _____

For problems 25-27, let $f(x) = \sqrt[3]{x+1}$.

25. Find the interval(s) where $f(x)$ is concave upward.

Answer: _____

26. Find the interval(s) where $f(x)$ is concave downward.

Answer: _____

27. Find the x-coordinate(s) of any point(s) of inflection.

Answer: _____

28. Find the horizontal and vertical asymptotes of the graph of $y = \dfrac{x^2 + 2x + 1}{x^2 - 6x + 8}$.

Horizontal: _____   Vertical: _____

29. Find the absolute maximum and the absolute minimum of $f(x) = x^3 - 3x + 2$ on $[-2,4]$.

Maximum: _____   Minimum: _____

30. A landlord owns an apartment building. When the rent for each apartment is $700 per month, all 100 apartments are rented. The landlord estimates that each $100 increase in the monthly rent will result in 10 apartments becoming vacant with no chance of being rented. What monthly rent amount will maximize the total monthly revenue?

Answer: _____