Pre-Calculus Test Review (Derivatives/Tangents, Critical Points)

Name:_________________________

I. Find the derivative.

1. $f(x) = 8$

2. $f(x) = 4x^3 - 2x^2 - 3x + 8$

3. $y = \dfrac{8x^7 - 4x^5 + 6x^2 - 3}{x^2}$

4. $f(x) = 3x^{-3} - 5x^{-2} - 4x$

5. $f(x) = -4x^3 + \dfrac{2}{x^2}$

6. $y = \dfrac{4x^6 - 3x^4 + 2x^3 - 5x + 1}{6}$

7. $f(x) = \dfrac{1}{(2x+1)^2}$

8. $f(x) = \sqrt{(1+x)^4}$

9. $f(x) = x^3(2x^2 + 1)$

10. $f(x) = \dfrac{4}{x^5} + 2x - \dfrac{6}{x^3} + 4x^{-4}$

11. $f(x) = (8x^3 - 2x + 5)^3$

12. $f(x) = 4\sqrt[5]{x^3} + \dfrac{5}{\sqrt[3]{x^4}}$

13. $f(x) = (\pi x)^3 - 3\pi x$

14. $f(x) = \sqrt[3]{2x^3 - x + 1}$

15. $f(t) = \dfrac{4}{t} - \dfrac{1}{6t^3} + \dfrac{1}{t^5}$

16. $f(x) = 5Ax^3 - 6Bx^2 - Cx + D$

17. $g(x) = (1+2x)(2 - x + x^2)$

18. $S(w) = \dfrac{w^2(2-w) + w^5}{3w}$

II. Find the equation of the line tangent to the graph. Write the equation in the stated form.

19. $f(x) = x^{\frac{1}{2}}(1 - x^3)$ at $x = 4$ (Point-slope form)

20. $f(x) = \dfrac{x^2 + x - 2}{2x}$ at $x = 1$ (Slope-intercept form)

21. $f(x) = 4(2x^2 - 3x - 1)^5$ at $x = 1$ (Standard Form)

III. Find the x and y intercepts.

22. $f(x) = 6x^2 + 7x - 5$

23. $f(x) = (x-2)^3$

IV. Answer the following

24. Use the First Derivative Test to find the critical points and determine on which interval(s) they are increasing/decreasing for $f(x) = 3x^3 - 18x^2 - 4$

25. Determine if there is a point of inflection for $f(x) = 12x^3$. If there is, what is it?

26. Use the First Derivative Test to determine the maximum/minimums for $f(x) = x^3 - 6x^2 + 9x$

27. Determine the intervals of concavity for $f(x) = x^5 + 4x^3 + 2$

28. The function *f* is given by $f(x) = x^4 - x^2 - 2$. On which intervals is *f* increasing and concave up?

Given the following information, find the value of the derivative at the given value of *x*. Not all the information is needed to calculate these.

x	*f(x)*	*g(x)*	*f'(x)*	*g'(x)*
1	4	4	5	5
4	0	1	7	½
6	6	6	4	3

29. $f(g(x))$ at $x = 6$

30. $\frac{1}{g(x)}$ at $x = 4$

31. $g(\sqrt{x})$ at $x = 16$

32. $\sqrt{f(x)}$ at $x = 6$