Honors Algebra III/ Differential Calculus Summer Work

(Review of Algebra II Concepts)

Directions: **Use a separate sheet of paper. All work must be shown in order to receive full credit. If you worked with someone on these problems (friend, parent, sibling, tutor, etc), please indicate so on the top of your paper.**

1. Write an equation for the line that passes through the point $(2, -5)$ and is perpendicular to the line $x + 3y = 4$.

Factor completely and simplify.

2. $\frac{1}{4}x^2 - x - 48$

3. $8x^{-\frac{1}{2}} + 3x^{\frac{1}{2}}$

4. $4x^2 + 28x + 49$

5. $8x^3 - 1$

6. $(2a + b)^2 - 100$

7. $x^3 + 3x^2 - 5x - 15$

Factor the greatest common factor from each polynomial.

8. $5(a-1)^3 - 2(a-1) + (a-1)^2$

9. $(5w - 6)(w + 2) + (2w - 1)(w + 2)$

10. Write as a product of <u>linear</u> factors: $x^4 - 9$

Simplify.

11. $6(x+5)^{-2} + (x+5)$

12. $\frac{3+7i}{3-7i}$

13. $\sqrt[3]{54x^7y^{15}}$

14. $\frac{x-3}{\sqrt{x+1}+2}$

15. Factor and Simplify the expression: $\frac{3x(4)(2x-1)^4 - (2x-1)^6(3)}{(3x)^2(4x^2-4x+1)}$

16. Find the average of the two real numbers: $\frac{x}{2}$ and $\frac{x}{10}$

17. Solve the equation: $20x^3 - 500x = 0$

Find all the zeros (real and imaginary) of the function.

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

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

Find the inverse of the function and write as a function of x.

20. $y = x^2 + 10x + 25$

21. $y = \frac{x-4}{x+3}$

22. Graph the function: $f(x) = -|x - 5| + 2$. Then give the domain and range of f.

23. Given $f(x) = x^2 - 2x - 3$, graph $y = |f(\mathrm{x})|$

Give the domain and range of each function.

24. $f(x) = x^2 - 6x + 10$

25. $g(x) = \sqrt{2x - 5}$

26. $h(x) = \frac{3}{x-2} + 4$

27. $k(x) = \sqrt[3]{x + 1} + 8$

28. Describe in words the transformations that map $f(x)$ onto $g(\mathrm{x})$.

$$f(x) = (x - 1)^2 + 2 \qquad g(x) = -(x + 3)^2 - 7$$

29. Given $f(x) = x^2 + 2x - 5$, find $f(k + 1) - f(k - 1)$.

Perform the indicated operation and simplify.

30. $\frac{2n^2-5n-12}{n^2-10n+24} \div \frac{4n^2-9}{n^2-9n+18}$

31. $\frac{3}{a-2} - \frac{1}{2-a}$

32. $\frac{1}{b^2-5b+6} + \frac{1}{b^2-4}$

33. $\frac{1+\frac{1}{x}}{1-\frac{1}{x}}$

Solve. Check for extraneous solutions.

34. $\sqrt{x + 3} = 1 + \sqrt{x + 1}$

35. $x + 2 = \sqrt{2x + 7}$