Math 161 Final Exam Name_____
Warm up problems: worth 2 points each.

1. The equation of the x-axis is _____ and the equation of the y-axis is _____

2. The equation of the unit circle is _____

3. For the polynomial $-2x^4+5x^2-2x-5$ the degree is _____, the leading coefficient is _____ and the constant is _____

4. A polynomial with degree 5 has at most _____ zeros.

5. If $2+\sqrt{7}$ is a root of a polynomial with integer coefficients, then so is _____

6. The expression $|x-5|\geq 7$ means the distance between ____ and ____ is greater than or equal to_____. Therefore the solution will contain _____ interval(s).

7. An even function is symmetric with respect to _____, whereas an odd function is symmetric with respect to _____.

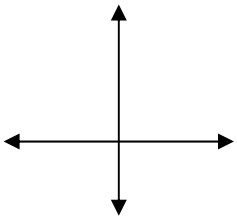
8. An example of an even function is _____, and an example of an odd function is _____.

9. A function is one to one if _____

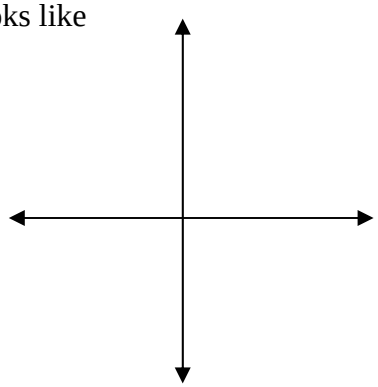
10. Any line defines a function except a _____ line.

11. The slope of a horizontal line is _____, whereas the slope of a vertical line is _____.

12. The graph of $y=x^2$ looks like



13. The graph of $y = (x-1)^2 + 2$ looks like



Problems 14 through 23 are worth 4 points each.

14. Find the distance between the points (2,5) and (-4,3), and find the midpoint.

Distance _____ Midpoint (,)

15. Simplify the compound fraction: $\dfrac{\frac{1}{x}-2}{\frac{2}{x-1}}$

16. Factor the difference of two cubes: $x^3 - 8y^3$

17. Rationalize the denominator: $\frac{7}{2-\sqrt{5}}$

18. Simplify, using positive exponents only: $\frac{(2y^2)^{-1}3x^{-2}}{xy^{-3}}$

19. Write the equation for the circle with center (0,0) and radius 2.

20. Find the domain of the function $f(x)=\frac{x}{2x-2}$

21. Solve the equation $(x+5)^2=9$

22. Solve the equation $x^2 - 2x - 6 = 0$

23. Solve the inequality $|x-5| \geq 2$. Write your answer in interval notation.

Problems 24 through 34 are worth 5 points each.

24. Find the inverse of the function $f(x) = 2x - 3$.

25. Find the equation of the line through the points (1,3) and (6,-2). Write your answer in the slope intercept form, i.e. in the form $y = mx + b$

26. Write the equation for the line with slope 2 through the point (1,5)

For 27 and 28, let $f(x) = x^2$, $g(x) = x + 1$

27. Find $\frac{g}{f}(3)$

28. Find $f \circ g$ and $g \circ f$

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29. Find the vertex and intercepts for the graph of $y = x^2 - 2x - 3$

30. Use synthetic division to show that –1 is a root of $f(x) = 2x^3 + 3x^2 - 5x - 6$, and factor *f(x)* into a linear factor times a quadratic.

31. Find the other two roots for the function in problem 30.

32. Write the function in factored completely as a product of three linear factors.

33. Find the horizontal and vertical asymptotes if any for the functions $f(x) = \frac{2x}{1-2x}$ and $g(x) = \frac{x}{1-x^2}$

34. Write the partial fraction decomposition for the rational expression $\frac{x-8}{(x+1)(x-2)}$