

Name: _____**Directions:** Complete all questions and **show all applicable work.** Partial credit will be given.

1.) [15pts] Graph the following function and state its domain and range. Then **find and graph** the inverse of the $f(x)$ and state its domain and range on a separate graph. How are the graphs related? How are the domain and ranges related?

$$f(x) = 2\sqrt{x-1}$$

2.) [10pts] Simplify:

$$\frac{5i+1}{3-i}$$

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3.) [15pts] Put the following quadratic function in standard form ($y = a(x - h)^2 + k$), then graph it clearly stating how you found the vertex, concavity (ie. open up or down), y-intercept and x-intercepts.

$$y = 2x^2 - 4x + 6$$

4.) [10pts] Graph the following function, *show* how you arrived at your solution, including intercepts, multiplicities and tail behavior:

$$f(x) = -3x^2(x^2 - 4)(x + 2)(x - 5)^2$$

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5.) [25pts] Solve the following equation for x in three ways, first using the (1) quadratic formula, then (2) factoring, and finally (3) by completing the squares. Are your answers all the same? Why or why not?

$$x^2 - 2x = -1$$

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6.) [5pts] Without actually dividing, how do we know if $x^3 + 4x^2 - 5x + 5$ can be divided by $x + 2$ cleanly (without remainder)? Does it?

7.) [20 pts] Divide the polynomial $x^3 + 4x^2 - 5x + 5$ by the term $x - 3$. Do it once with long division, then again with synthetic division. Are your answers the same? Should they be?