Name: Key **Period:** _____ **Date:** _____

PreCalculus Chapter 3 Practice Test

Answer the following questions. Be sure to show all work.

1. For $f(x) = x^3 - 3x - 2$

   a. Describe the end behavior.

   $x \to \infty$, $y \to \infty$; $x \to -\infty$, $y \to -\infty$

   b. List the possible rational zeros $\left(\pm\frac{p}{q}\right)$.

   $\pm\frac{2}{1}, \pm\frac{1}{1}$

   c. Find the zeros (x-intercepts) and state the multiplicity of each.

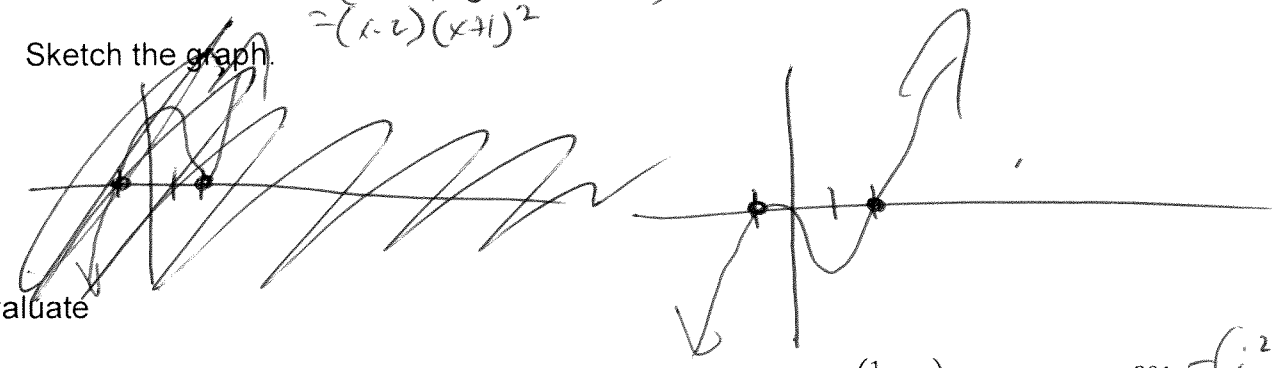
   $2 \mid 1 \;\; 0 \;\; -3 \;\; -2$; $\quad 2 \;\; 4 \;\; 2$; $\quad 1 \;\; 2 \;\; 1 \;\; 0$

   $(x-2)(x^2+2x+1)$ mult: 1 2

   $=(x-2)(x+1)(x+1) \Rightarrow x = 2, -1, -1$

   $=(x-2)(x+1)^2$

   d. Sketch the graph.



2. Evaluate

   a. $6i - (4 - i)$ $\quad 6i - 4 + i$ $\quad 7i - 4$

   b. $(2 - 5i) + (3 + 4i)$ $\quad 5 - i$

   c. $4\left(\frac{1}{2} - i\right)$ $\quad 2 - 4i$

   d. i^{201} $\quad = (i^2)^{100} \cdot i$ $\quad = (-1)^{100} \cdot i$ $\quad = i$

   e. $\frac{1}{1+i} \cdot \frac{1-i}{1-i}$ $\quad \frac{1-i}{1-i^2} = \frac{1-i}{2}$

   f. $\frac{(1+2i)(3-i)}{2+i} = \frac{3 + 5i - 2i^2}{2+i} \cdot \frac{2-i}{2-i}$ $\quad \frac{15+5i}{4-i^2} = \frac{15+5i}{5} = 3+i$

   g. $\frac{1-\sqrt{-1}}{1+\sqrt{-1}} = \frac{1-i}{1+i} \cdot \frac{1-i}{1-i}$ $\quad = \frac{1-2i+1}{2}$ $\quad = \frac{2-2i}{2} = 1-i$

3. Find the quotient and remainder using long division: $\frac{9x^2 - x + 5}{3x^2 - 7x}$

$3x^2 - 7x \;\overline{)\; 9x^2 - x + 5}$ $\quad 3$

$9x^2 - 21x$

$20x + 5$

$\Rightarrow 3 + \frac{20x + 5}{3x^2 - 7x}$

3. Solve (Find zeros): $x^2 + 2x + 2 = 0$

$x = \frac{-2 \pm \sqrt{4-4(1)(2)}}{2} = \frac{-2 \pm \sqrt{-4}}{2} = \frac{-2 \pm 2i}{2} = -1 \pm i$

4. For $f(x) = 2x^4 - 7x^3 - 4x^2 - 50x - 25$

a. Describe the end behavior.

$x \to \infty$, $x \to -\infty$

$y \to \infty$ / $y \to \infty$.

b. How many zeros does this function have? 4

c. List the possible rational zeros $\left(\pm\frac{p}{q}\right)$. $\pm\frac{1}{1}, \pm\frac{5}{1}, \pm\frac{25}{1}, \pm\frac{1}{2}, \pm\frac{5}{2}, \pm\frac{25}{2}$.

d. Find the zeros (x-intercepts) and state the multiplicity of each.

5	2	-7	-4	-50	-25
(1)		10	15	55	25
	2	3	11	5	0

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

$= (x-5)(x+\frac{1}{2})(2x^2+2x+10)$

$= 2(x-5)(x+\frac{1}{2})(x^2+x+5)$

$x = 5, -\frac{1}{2}$

(1) (1)

-1/2	2	3	11	5
(1)		-1	-2	-5
	2	2	10	0

$x = \frac{-1 \pm \sqrt{1-4(1)(5)}}{2}$

$= \frac{-1 \pm \sqrt{-19}}{2}$

$= \frac{-1 \pm i\sqrt{19}}{2}$ (1) each

Not on graph

e. Sketch the graph.