121-G12 Quiz 10 – More Chapter 3
Fall, 2012 Name KEY ___________

3.3 Find the product (5 pts) **18.** $[x - (3 - \sqrt{5})][x - (3 + \sqrt{5})]$

$= x^2 - (3+\sqrt{5})x - (3-\sqrt{5})x - (3-\sqrt{5})(3+\sqrt{5})$

$= x^2 - (3x + \sqrt{5}x) - (3x - \sqrt{5}x) - (9 + 3\sqrt{5} - 3\sqrt{5} - \sqrt{5}\sqrt{5})$

$= x^2 - 3x - \sqrt{5}x - 3x + \sqrt{5}x - (9-5) = x^2 - 6x - 4$

1. 3.3 Find a polynomial with real coefficients that has the given zero. (5 pts) Leave it in factored form: **28.** $4 + i$

$(x - (4+i))(x - (4-i))$

2. 3.3 Use the Rational Zeros Theorem (3 pts) and Descartes's Rule of Signs (3 pts) to to find all real and imaginary roots of the equation. Final answer: (4 pts).

67. $6x^3 + 25x^2 - 24x + 5 = 0$

$\frac{p}{q}$: $\pm 1, \pm\frac{1}{2}, \pm\frac{1}{3}, \pm\frac{1}{6}, \pm 5, \pm\frac{5}{2}, \pm\frac{5}{3}, \pm\frac{5}{6}$

Descartes: 2 or 0 positive zeros

$f(-x) = -6x^3 + 25x^2 + 24x + 5$: 1 negative zero

$$\begin{array}{r|rrrr} -5 & 6 & 25 & -24 & 5 \\ & & -30 & 25 & -5 \\ \hline & 6 & -5 & 1 & 0 \end{array}$$

If your homework is done, then there will be no wrong guesses here.

$6x^2 - 5x + 1 = 0$

$b^2 - 4ac = (-5)^2 - 4(6)(1)$

$= 25 - 24 = 1$

It factors!

$(3x - 1)(2x - 1) = 0$

$x = \frac{1}{3}, \frac{1}{2}$

Real zeros (ALL): $\boxed{x = -5, \frac{1}{3}, \frac{1}{2}}$

$f(x) = 6(x+5)(x-\frac{1}{3})(x-\frac{1}{2})$

3. 3.4 Find all real solutions to the equation. (5 pts) Check your answers.

12. $\sqrt{x-1} = x - 7$

$$\left(\sqrt{x-1}\right)^2 = (x-7)^2$$

$$x - 1 = x^2 - 14x + 49$$

$$x^2 - 15x + 50 = 0$$

$$(x-5)(x-10) = 0$$

$$x \in \{5, 10\}$$

→ No. Extraneous

$$\sqrt{5-1} \stackrel{?}{=} 5-7$$

$$2 \stackrel{?}{=} -2 \quad \text{No}$$

$$\sqrt{10-1} \stackrel{?}{=} 10-7$$

$$3 \stackrel{?}{=} 3 \quad ✓$$

$$\boxed{x \in \{10\}}$$

4. 3.6 Solve the inequalities: (5 pts each)

95. $\dfrac{x-4}{x+2} \le 0$

Want ≤ 0

want " $-$ "

$+ \quad | \quad - \quad | \quad +$

$-2 \qquad 4$

$$\boxed{x \in (-2, 4]}$$

$-2 \notin \mathcal{D}$

97. $\dfrac{q-2}{q+3} < 2 \cdot \dfrac{q+3}{q+3}$

$$\frac{q-2}{q-3} - \frac{2q+6}{q+3} < 0$$

$$\frac{q-2-2q-6}{q+3} < 0$$

$$\frac{-q-8}{q+3} < 0$$

want "<0"

want "$-$"

$- \quad | \quad + \quad | \quad -$

$-8 \qquad -3$

Test: $x=0$: $\dfrac{-8}{3} = -\dfrac{8}{3} < 0$

$$x \in (-\infty, -8) \cup (-3, \infty)$$