Test 2 - Review

1) $6x^2 - 11x = 7$

$6x^2 - 11x - 7 = 0$

$6x^2 + 3x - 14x - 7 = 0$

$3x(2x+1) - 7(2x+1) = 0$

$(3x-7)(2x+1) = 0$

$3x - 7 = 0 \quad 2x + 1 = 0$

$3x = 7 \quad 2x = -1$

$x = 7/3 \quad x = -1/2$

$\{-1/2, 7/3\}$

2) $(3x+1)^2 = 8$

$\sqrt{(3x+1)^2} = \pm\sqrt{8}$

$3x + 1 = \pm 2\sqrt{2}$

$3x = 1 \pm 2\sqrt{2}$

$x = \frac{1 \pm 2\sqrt{2}}{3}$

$x = \left\{\frac{1-2\sqrt{2}}{3}, \frac{1+2\sqrt{2}}{3}\right\}$

3) $3x^2 + 2x + 2 = 0$

$b^2 - 4ac = 2^2 - 4(3)(2)$

$= 4 - 24 = -20$

$x = \frac{-2 \pm \sqrt{-20}}{2(3)} = \frac{-2 \pm i\sqrt{20}}{6}$

$= \frac{-2 \pm 2i\sqrt{5}}{6} = \frac{-1 \pm i\sqrt{5}}{3}$

4) $\sqrt{3x+4} + 4 = 2x$

$\sqrt{3x+4} = 2x - 4$

$3x + 4 = 4x^2 - 16x + 16$

$0 = 4x^2 - 19x + 12$

$4x^2 - 19x + 12 = 0$

$4x^2 - 3x - 16x + 12 = 0$

$x(4x-3) - 4(4x-3) = 0$

$(x-4)(4x-3) = 0$

$x - 4 = 0 \quad 4x - 3 = 0$

$x = 4 \quad 4x = 3$

$x = 3/4$

$\{3/4, 4\}$

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

$\sqrt{-2x+3} = 3 - \sqrt{x+3}$

$-2x + 3 = 9 - 6\sqrt{x+3} + x + 3$

$-3x - 9 = -6\sqrt{x+3}$

$-x - 3 = -2\sqrt{x+3}$

$x^2 + 6x + 9 = 4(x+3)$

$x^2 + 6x + 9 = 4x + 12$

$x^2 + 2x - 3 = 0$

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

$x = \{-3, 1\}$

6) $x^4 + 17x^2 + 16 = 0$

$a = x^2$

$a^2 + 17a + 16 = 0$

$(a+16)(a+1) = 0$

$a = -16 \quad a = -1$

$x^2 = -16 \quad x^2 = -1$

$x = \pm\sqrt{-16} \quad x = \pm\sqrt{-1}$

$x = \pm 4i \quad x = \pm i$

7) $x^{2/3} - 9x^{1/3} + 8 = 0$

$a = x^{1/3}$

$a^2 - 9a + 8 = 0$

$(a-8)(a-1) = 0$

$a = 8 \quad a = 1$

$x^{1/3} = 8 \quad x^{1/3} = 1$

$x = 2 \quad x = 1$

$\{1, 2\}$

8) $x^{-2} - 2x^{-1} - 3 = 0$

$a = x^{-1}$

$a^2 - 2a - 3 = 0$

$(a-3)(a+1) = 0$

$a - 3 = 0 \quad a + 1 = 0$

$a = 3 \quad a = -1$

$x^{-1} = 3 \quad x^{-1} = -1$

$x = 1/3 \quad x = -1$

$\{1/3, -1\}$

9) $8x^2 = 2x - 6$

$8x^2 - 2x + 6 = 0$

$a \quad b \quad c$

$b^2 - 4ac = (-2)^2 - 4(8)(6)$

$= 4 - 192 = -188$

2 complex solutions

10) $16x^2 + 3 = 26x$

$16x^2 - 26x + 3 = 0$

$b^2 - 4ac = (-26)^2 - 4(16)(3)$

$= (-2 \cdot 13)^2 - 4(16)(3)$

$= 4 \cdot 169 - 4 \cdot 48$

$= 676 - 192 = 484$

$b^2 - 4ac = 484 = (22)^2$

2 Real solutions

FACTORABLE over RATIONAL #

11) $2x^2 - x - 3 \geq 0$

Find boundary

$(2x-3)(x+1) \geq 0$

$x = 3/2 \quad x = -1$

$-1, 3/2$ boundary

TEST at

$-2 \quad 0 \quad 2$

$2(-2)^2 - (-2) - 3 \geq 0$

$8 + 2 - 3 \stackrel{?}{\geq} 0$

$7 \geq 0$ ✓ $(-\infty, -1]$

$2(0) - 0 - 3 \geq 0$

$-3 \geq 0$ NO ✗

$2(2)^2 - 2 - 3 \geq 0$

$8 - 5 \geq 0$

$3 \geq 0$ ✓ $[3/2, \infty)$

$(-\infty, -1] \cup [3/2, \infty)$

12) $4x^2 + 2x + 1 \leq 0$

$b^2 - 4ac = 4 - 4 \cdot 4 \cdot 1 = -12$

2 complex solutions

$\{\emptyset\}$ no soln

13) $9x^2 + 12x + 4 > 0$

$(3x+2)^2 > 0$

boundary at $-2/3$

-1

$9(-1)^2 + 12(-1) + 4 > 0$

$9 - 12 + 4 > 0$ ✓

$9 > 0$ ✓

exclude $-2/3$

$(-\infty, -2/3) \cup (-2/3, \infty)$

14) $\frac{x+1}{x-3} < 5$

$x+1 = 5(x-3)$
$x+1 = 5x-15$
$16 = 4x$
$4 = x$

3, 4 test 0, 3.5, 5

0 we get $\frac{0+1}{0-3} < 5$

$-\frac{1}{3} < 5$ ✓

3.5 $\frac{3.5+1}{3.5-3} < 5$ $\frac{4.5}{.5} < 5$

$9 < 5$ ✗

5 $\frac{5+1}{5-3} < 5$ $\frac{6}{2} < 5$ ✓

$(-\infty, 3) \cup (4, \infty)$

15) $\frac{3x+6}{x-5} > 0$

$3x+6=0$
$x=-2$ & $x=5$ (excluded)

Test $-3, 0, 6$

$\frac{3(-3)+6}{-3-5} > 0$ $\frac{3(0)+6}{0-5} > 0$

$\frac{-9+6}{-8} > 0$ $\frac{6}{-5} > 0$

$\frac{-3}{-8} > 0$ ✓ ✗

$\frac{3(6)+6}{6-5} > 0$

$\frac{24+6}{1} > 0$ ✓

$(-\infty, -2) \cup (5, \infty)$

16) $|2x+1| \geq 11$

$-11 \geq 2x+1$ $2x+1 \geq 11$
$-12 \geq 2x$ $2x \geq 10$
$-6 \geq x$ $x \geq 5$

$(-\infty, -6] \cup [5, \infty)$

17) $|2x-5| < 9$

$-9 < 2x-5 < 9$
$-4 < 2x < 14$
$-2 < x < 7$
$(-2, 7)$

18) $|7x+8| - 2 > 1$

$|7x+8| > 3$

$7x+8 < -3$ $7x+8 > 3$
$7x < -11$ $7x > -5$

$x < -\frac{11}{7}$ $x > -\frac{5}{7}$

$(-\infty, -\frac{11}{7}) \cup (-\frac{5}{7}, \infty)$

19) $|3x+7| < 0$

NO SOLUTION

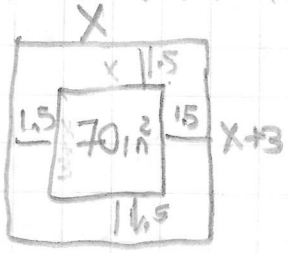
20) $|4x-12| > -2$

all real numbers

21) $|7-2x| \leq -2$

NO solution

22) Draw a sketch



$70 = (x-3)(x+3-3)$

$= (x-3)(x)$

$70 = x^2 - 3x$

$0 = x^2 - 3x - 70$

$= (x-10)(x+7)$

$x = -7$ or 10

Ignore -7 in outside dimensions

10×13

23) $S = 220t - 16t^2$

Solve for $S = 750$

$750 = 220t - 16t^2$

$0 = -16t^2 + 220t - 750$

$0 = 16t^2 - 220t + 750$

$b^2 - 4ac = 400$

$x = \frac{220 \pm \sqrt{400}}{2(16)}$

$= \frac{220 \pm 20}{32} =$

$\frac{240}{32}$ sec $\quad \frac{200}{32}$ sec

7.5 sec $\quad$ 6.25 sec