Worksheet #22 **Answers**

1) $x(x - 2)(x - 2) = 0$
$x = \{0, 2, 2\}$

2) $\frac{1}{2}(x^2 - 1)(x^2 + 1) = 0$
$(x - 1)(x + 1)(x^2 + 1) = 0$
$x = \{-1, 1, -i, i\}$

3) $2(x^2 - 5)(x^2 + 4) = 0$
$x^2 - 5 = 0 \quad x^2 + 4 = 0$
$x = \{-\sqrt{5}, \sqrt{5}, -2i, 2i\}$

4) $x(x^2 - 3)(x^2 - 3) = 0$
$x = 0 \quad x^2 - 3 = 0 \quad x^2 - 3 = 0$
$x = \{0, -\sqrt{3}, \sqrt{3}, -\sqrt{3}, \sqrt{3}\}$

5) $(x^3 - 25x) + (-4x^2 + 100) = 0$
$x(x^2 - 25) - 4(x^2 - 25) = 0$
$(x - 4)(x - 5)(x + 5) = 0$
$x = \{4, 5, -5\}$

6) $(6x^5 - 21x^3) + (10x^2 - 35) = 0$
$3x^3(2x^2 - 7) + 5(2x^2 - 7) = 0$
$(3x^3 + 5)(2x^2 - 7) = 0$
$x = \{-\sqrt[3]{(5/3)}, -\sqrt[3]{(5/3)}, -\sqrt[3]{(5/3)}, \sqrt{(7/2)}, -\sqrt{(7/2)}\}$

7) $(21x^3 - 77x) + (27x^2 - 99) = 0$
$7x(3x^2 - 11) + 9(3x^2 - 11) = 0$
$(7x + 9)(3x^2 - 11) = 0$
$x = \{-9/7, -\sqrt{(11/3)}, \sqrt{(11/3)}\}$

8) $(x^3 + 8x) + (-3x^2 - 24) = 0$
$x(x^2 + 8) - 3(x^2 + 8) = 0$
$(x - 3)(x^2 + 8) = 0$
$x = \{3, -2i\sqrt{2}, 2i\sqrt{2}\}$

9) $f(x) = x(x + 2)(x + 3)$
$f(x) = x^3 + 5x^2 + 6x$

10) $f(x) = x(x - 4)(x + 3)(x - 3)$
$f(x) = (x^2 - 4x)(x^2 - 9)$
$f(x) = x^4 - 4x^3 - 9x^2 + 36x$

11) irrationals: sum = 8 product = 16 - 5 = 11
$f(x) = (x - 2)(x^2 - 8x + 11)$
$f(x) = x^3 - 10x^2 + 27x - 22$

12) imaginaries: sum = 6 product = 9 + 1 = 10
$f(x) = (x + 6)(x^2 - 6x + 10)$
$f(x) = x^3 - 26x + 60$

13) $g(x) = -1(x^2 - 8x) - 7$
$g(x) = -1(x^2 - 8x + 16) - 7 - -16$
$g(x) = -(x - 4)^2 + 9$
From f(x) there is a reflection in the x-axis and a shift 4 units right and 9 units up.

14) $h(x) = 2(x^2 - 10x) + 11$
$h(x) = 2(x^2 - 10x + 25) + 11 - 50$
$h(x) = 2(x - 5)^2 - 39$
From f(x) there is a stretch by 2 and a shift 5 units right and 39 units down.