Advanced Algebra Worksheet
Writing Equations of Polynomials

Name _____

Find the equation of the polynomial with the given roots. Show all work!

1. 4 and 7

$x = 4$
$x - 4 = 0$
$x = 7$
$x - 7 = 0$

$(x-4)(x-7)$
$= x^2 - 7x - 4x + 28$
$= x^2 - 11x + 28$

2. $\frac{1}{2}$, -1 and 0

$x = \frac{1}{2}$
$2x = 1$
$2x - 1 = 0$
$x = -1$
$x - 1 = 0$
$x = 0$

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

3. 2i and -7

$= \pm 2i$
$= \pm\sqrt{-4}$
$^2 = -4$
$^2 + 4 = 0$
$= -7$
$+ 7 = 0$

$(x^2+4)(x+7)$
$= x^3 + 7x^2 + 4x + 28$

4. $\sqrt{11}$ and 4 with a multiplicity of 2

$x = \pm\sqrt{11}$
$x^2 = 11$
$x^2 - 11 = 0$
$x = 4$
$x - 4 = 0$
$x = 4$
$x - 4 = 0$

$(x^2-11)(x-4)(x-4)$
$= (x^2-11)(x^2-4x-4x+16)$
$= (x^2-11)(x^2-8x+16)$
$= x^4 - 8x^3 + 16x^2 - 11x^2 + 88x - 176$
$= x^4 - 8x + 5x^2 + 88x - 176$

5. $\frac{7}{5}$, -2 and 0 with a multiplicity of 3

$= \frac{7}{5}$
$x = 7$
$x - 7 = 0$
$= -2$
$+ 2 = 0$
$= 0$
$= 0$
$= 0$

$(5x-7)(x+2)(x)(x)(x)$
$= (5x^2 + 10x - 7x - 14)(x^3)$
$= (5x^2 + 3x - 14)(x^3)$
$= 5x^5 + 3x^4 - 14x^3$

6. $\sqrt{2}$ and 6

$x = \pm\sqrt{2}$
$x^2 = 2$
$x^2 - 2 = 0$
$x = 6$
$x - 6 = 0$

$(x^2-2)(x-6)$
$= x^3 - 6x^2 - 2x + 12$

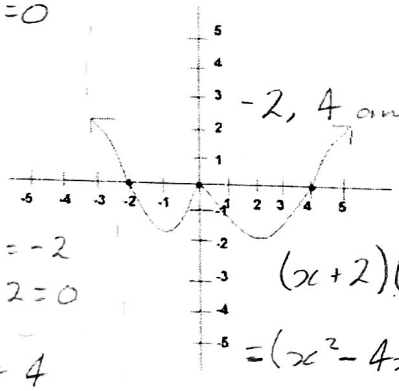
7. i and 8i

$x = \pm i$
$: = \pm\sqrt{-1}$
$^2 = -1$
$^2 + 1 = 0$

$x = 8i$
$x = \pm\sqrt{-64}$
$x^2 = -64$
$x^2 + 64 = 0$

$(x^2+1)(x^2+64)$
$= x^4 + 64x^2 + x^2 + 64$
$= x^4 + 65x^2 + 64$

8.



-2, 4 and 0 mult. 2

$x = -2$
$x + 2 = 0$
$x = 4$
$x - 4 = 0$
$x = 0$
$x = 0$

$(x+2)(x-4)(x)(x)$
$= (x^2 - 4x + 2x - 8)(x^2)$
$= (x^2 - 2x - 8)(x^2)$
$= x^4 - 2x^3 - 8x^2$