6.7 Writing Polynomial Functions

std. 10.0

r is a zero
x - r is a factor

Theorem If r_1 , r_2 , . . . are zeros of f(x), then
$f(x) = (x - r_1)(x - r_2) \ldots$

Examples: ***Write a polynomial function of least degree with the given zeros.***

ex. 1 **0, -1, $\frac{2}{3}$**

$x = \frac{2}{3}$
$3x - 2 = 0$

$$f(x) = x(x+1)\left(x-\frac{2}{3}\right)$$
$$= x(x+1)(3x-2)$$
$$= (x^2+x)(3x-2)$$
$$f(x) = 3x^3 + x^2 - 2x$$

ex. 2 $-\sqrt{2}, 3i$
$\sqrt{2}, -3i$

$x^2 - 9i^2$

$$f(x) = (x+\sqrt{2})(x-\sqrt{2})(x-3i)(x+3i)$$
$$= (x^2-2)(x^2+9)$$
$$f(x) = x^4 + 7x^2 - 18$$

ex. 3 $1, -2, 3-\sqrt{2}, 3+\sqrt{2}$

$$f(x) = (x-1)(x+2)(x-(3-\sqrt{2}))(x-(3+\sqrt{2}))$$
$$= (x^2+x-2)(x^2-(3+\sqrt{2})x-(3-\sqrt{2})x+(9-2))$$
$$(x^2+x-2)(x^2-6x+7)$$
$$f(x) = x^4 - 5x^3 - x^2 + 19x - 14$$

Quiz 6G

-2 is a zero of $f(x)=3x^3+x^2-8x+4$

find the other zeros