

Polynomial Assessment

1. Write any polynomial in standard form that leaves a remainder of 3 when divided by  $x+2$  and the leading coefficient is 3.

$$3x+9$$

$$P(x) = (x+2)^3 + 3$$

$$P(x) = (x+2)Q(x) + 3$$

$$3x+9$$

2. Let  $P(x)$  be a third degree polynomial with rational coefficients and leading coefficient is 1. One root is  $1+2i$ . The constant term is 20.

- a. Explain how you know what the other two roots are.

$1-2i$  and  $-4$ . CCT means conjugate of  $1+2i$  is a root  $(1-2i)$ . Product of roots is  $-20$  and  $(1+2i)(1-2i)=5$

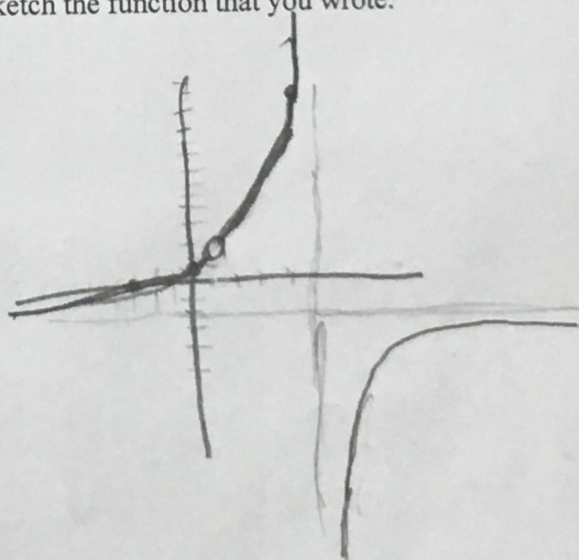
- b. How can you efficiently use the roots to determine the coefficient of  $x^2$ ? Do

so.

Sum of Roots =  $-\frac{b}{a}$   
 $1-2i + 1+2i - 4 = -6$   
 $b = 2$

3. Write the equation of a rational function with a hole at  $x=1$ , one  $x$  intercept, 1 vertical asymptote and the HA is  $y=-2$ . Sketch the function that you wrote:

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



Double Check:

$$(x - (1+2i))(x - (1-2i))$$

$$x^2 - x - 2i - x + 2i + 5$$

$$x^3 + 2x^2 - 3x + 20$$

$$(x^2 - 2x + 5)(x+4) = x^3 + 4x^2 - 2x^2 - 8x + 5x + 20$$