

Write a polynomial function of minimum degree in standard form with real coefficients whose zeros include those listed.

a) 2, 5i, and -6i

b) -2, 3, and 2-i -2, 3, 2-i, 2+i

$$(x+2)(x-3)(x-(2-i))(x-(2+i))$$

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

$$[(x-2)+i][(x-2)-i]$$

$$x^4 + 4x^3 + 5x^2$$

$$-x^3 - 4x^2 - 5x$$

$$-6x^2 - 24x - 30$$

$$(x^2 - x - 6)(x^2 + 4x + 5)$$

$$x^4 + 3x^3 - 5x^2 - 24x - 30$$

c) -4, 2+3i, 2-3i

$$(x+4)(x-(2+3i))(x-(2-3i))$$

$$(x+4)(x-2-3i)(x-2+3i)$$

$$(x+4)[(x-2)-3i][(x-2)+3i]$$

$$(x+4)[(x-2)^2 - 9i^2]$$

$$(x+4)(x^2 - 4x + 4 + 9)$$

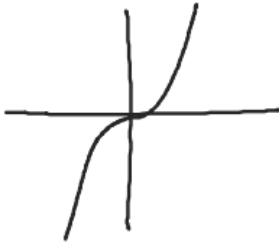
$$x^3 - 3x + 52$$

$$(x+4)(x^2 - 4x + 13)$$

$$x^3 - 4x^2 + 13x$$

$$+ 4x^2 - 16x + 52$$

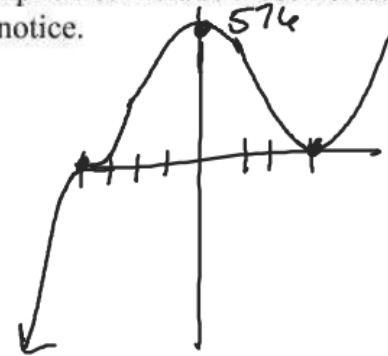
$$y = x^3$$



Write a polynomial function of minimum degree in standard form with real coefficients whose zeros and their multiplicities include those listed. Then sketch a graph and discuss what you notice.

- a) 3 (multiplicity 2), -4 (multiplicity 3)

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

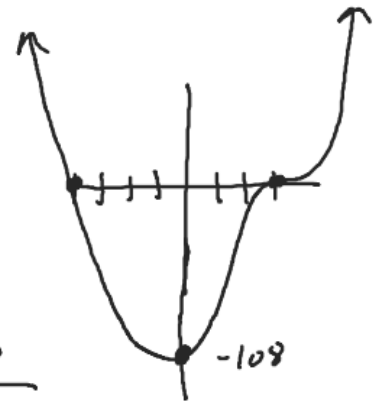


- b) 3 (multiplicity 3), -4 (multiplicity 1)

$$\frac{(x-3)(x-3)}{(x^2-6x+9)} \frac{(x-3)(x+4)}{(x^2+x-12)} (x-3)^3 (x+4)$$

$$\begin{array}{r} x^4 + x^3 - 12x^2 \\ -6x^3 - 6x^2 + 72x \\ \quad 9x^2 + 9x - 108 \\ \hline x^4 - 5x^3 - 9x^2 + 81x - 108 \end{array}$$

$$x^4 - 5x^3 - 9x^2 + 81x - 108$$



- c) 5 (multiplicity 2), $2 + i$ (multiplicity 1)

Find all of the zeros and write a linear factorization of the function

28) $f(x) = x^3 - 10x^2 + 44x - 69$

$$\begin{array}{r|rrrr} 3 & 1 & -10 & 44 & -69 \\ & & 3 & -21 & 69 \\ \hline & 1 & -7 & 23 & 0 \end{array}$$

$$x^2 - 7x + 23 = 0$$

$$(x-3) \left(x - \frac{7}{2} + \frac{\sqrt{43}i}{2}\right) \left(x - \frac{7}{2} - \frac{\sqrt{43}i}{2}\right)$$

$$\frac{7 \pm \sqrt{7^2 - 4(1)(23)}}{2}$$

$$\frac{7 \pm \sqrt{49 - 92}}{2}$$

$$\frac{7 \pm \sqrt{-43}}{2}$$

$$\frac{7}{2} \pm \frac{\sqrt{43}i}{2}$$

A) $f(x) = x^5 - 3x^4 - 5x^3 + 5x^2 - 6x + 8$

Using the given zero find all of the zeros and write a linear factorization

33) $f(x) = x^4 - 2x^3 - x^2 + 6x - 6$ zero: $1 + i$

Write the function as a product of linear and irreducible quadratic factors all with real coefficients.

42) $f(x) = x^4 - 2x^3 + x^2 - 8x - 12$

$$x = 3, -1, \pm 2i$$

$$(x-3)(x+1)(x-2i)(x+2i)$$

$$(x-3)(x+1)(x^2+4)$$



$$x^2 + 4 = 0$$

$$x^2 = -4$$