

Factor completely.

1) $6ax + 15bx$

$3x(2a + 5b)$

2) $36a^2 - 81b^2$

$9(4a^2 - 9b^2)$
 $9(2a + 3b)(2a - 3b)$

3) $2x^2 - 21xy - 36y^2$

$(2x + 3y)(x - 12y)$

4) $x^3 - 8y^3$

$(x - 2y)(x^2 + 2xy + 4y^2)$

5) $12x^2 + 35x + 8$

$(4x + 1)(3x + 8)$

6) $9 - x^2 + 8x - 16$

$-x^2 + 8x - 7$
 $-(x^2 - 8x + 7)$
 $-(x - 1)(x - 7)$

7) $x^4 - 10x^2 + 9$

$(x^2 - 1)(x^2 - 9)$

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

8) $7x^3 - 14x^2 - 3x + 6$

$7x^2(x - 2) - 3(x - 2)$

$(7x^2 - 3)(x - 2)$

9) $3x^3 - 2x^2 - 7x - 2$ Poss Zeros $\pm 1, 2, \frac{1}{3}, \frac{2}{3}$

$$\begin{array}{r|rrrr} -1 & 3 & -2 & -7 & -2 \\ & \downarrow & & & \\ & 3 & -5 & -2 & 0 \end{array}$$

$(x + 1)(3x^2 - 5x - 2)$
 $(x + 1)(3x + 1)(x - 2)$

Solve each quadratic given that the domain is the set of complex numbers.

10) $x^2 + 10x + 29 = 0$

$x = \frac{-10 \pm \sqrt{100 - 4 \cdot 29}}{2}$

$= \frac{-10 \pm \sqrt{-16}}{2}$

$= \frac{-10 \pm 4i}{2} = \boxed{-5 \pm 2i}$

11) $x^2 + 16 = 0$

$x^2 = -16$

$x = \pm 4i$

12) $x^2 - 2x + 5 = 0$

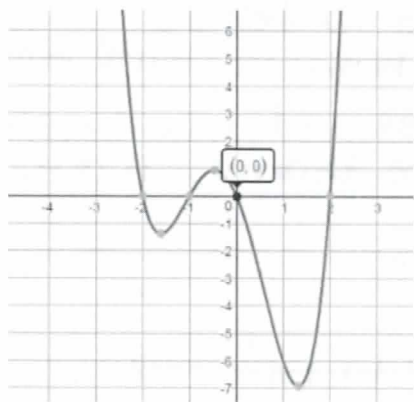
$x = \frac{2 \pm \sqrt{4 - 4 \cdot 5}}{2}$

$\frac{2 \pm \sqrt{-16}}{2} = \frac{2 \pm 4i}{2}$

$= \boxed{1 \pm 2i}$

Write the equation of the polynomial in factored form.

13)



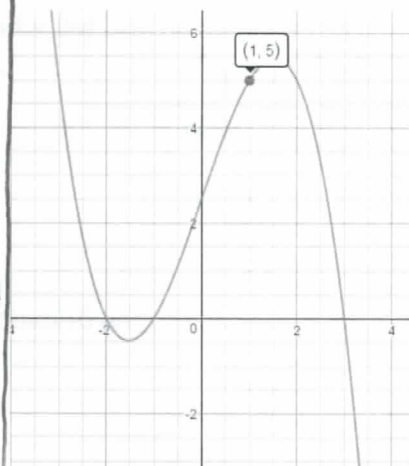
$f(x) = a(x + 2)(x + 1)x(x - 2)$

$0 = a(2)(1)(0)(-2)$

$f(x) = x(x + 2)(x + 1)(x - 2)$

14)

$f(x) = -\frac{5}{12}(x + 2)(x - 3)(x + 1)$

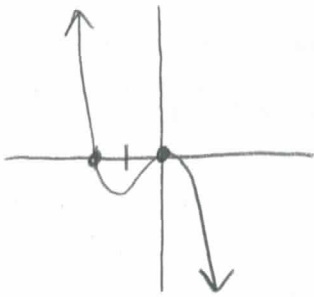


$f(x) = a(x + 2)(x + 1)(x - 3)$

$5 = a(3)(2)(-2) \Rightarrow a = -5/12$

Graph each function. Be sure to find the zeros and y-intercept.

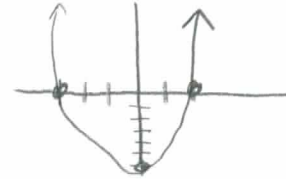
20) $P(x) = -x^2(x+2)$ y.int (0,0)



21) $P(x) = x^4 + x^3 - 5x^2 + x - 6$ y.int (0,-6)

$$\begin{array}{r|rrrrr} 2 & 1 & 1 & -5 & 1 & -6 \\ & \downarrow & 2 & 6 & 2 & 6 \\ \hline & 1 & 3 & 1 & 3 & 0 \\ 3 & \downarrow & -3 & 0 & -3 & \\ \hline & 1 & 0 & 1 & 0 & \end{array}$$

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

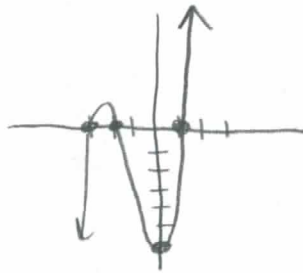


22) $P(x) = x^3 + 4x^2 + x - 6$ POSS ZEROS: $\pm 1, 2, 3, 6$

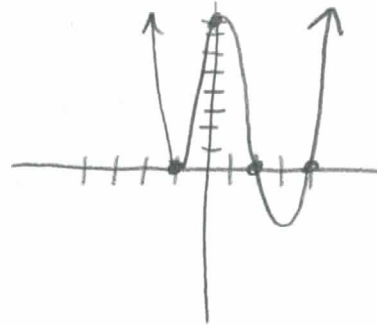
$$\begin{array}{r|rrrr} 1 & 1 & 4 & 1 & -6 \\ & \downarrow & 1 & 5 & 6 \\ \hline & 1 & 5 & 6 & 0 \end{array}$$

$(x-1)(x^2+5x+6)$
 $(x-1)(x+3)(x+2)$

y.int (0,-6)



23) $P(x) = (x+1)^2(x-2)(x-4)$ y.int (0,8)



24) (from your text: #1 p.550) A horizontal beam 10 meters long has its left end built into a wall, and its right end resting on a support. The beam is loaded with weight uniformly distributed along its length. As a result, the beam sags downward according to the equation $y = -x^4 + 25x^3 - 150x^2$ where x is the numbers of meters from the wall to a point on the beam, and y is the number of hundredths of a millimeter from the x -axis to the beam.

a) What is an appropriate domain for x ?

domain is $0 \leq x \leq 10$ because the beam is only 10 meters long

b) Find the zeros of the function and tell what they represent in the context of the problem.

$$y = -x^4 + 25x^3 - 150x^2$$

$$0 = -x^2(x^2 - 25x + 150)$$

$$0 = -x^2(x - 15)(x - 10)$$

$$x = 0, 15, 10$$

The zeros of 0 and 10 tell us that where the beam is built into the wall and secured on a support (the ends of the beam), it does not sag.

c) Using all integer values of x in the domain, plot a graph of this function.

x	y	x	y
0	0	6	-1296
1	-126	7	-1176
2	-416	8	-896
3	-756	9	-486
4	-1056	10	0
5	-1250		

