

Algebra 2/Trig  
Chapter 6 Review

1) Write a polynomial function of least degree with integral coefficients that has the given zeros.  $-3, 2i$

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

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

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

2) Write a cubic function whose graph passes through the given points.

$(2, 0), (4, 0), (-3, 0), (3, 12)$

$$12 = a(3-2)(3-4)(3+3)$$

$$12 = a(1)(-1)(6)$$

$$12 = -6a$$

$$-2 = a$$

Divide using long division

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

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

$$-3 \begin{array}{r|rrrr} 1 & 3 & 4 & 12 \\ & -3 & 0 & -12 \\ \hline & 1 & 0 & 4 & 0 \end{array}$$

3)  $(4n^4 + 14n^3 + 4n^2 - 29n - 30) \div (2n + 5)$

4.  $(16b^4 - 25b^3 + b - 2) \div (b^2 - 1)$

$$2n+5 \overline{) 4n^4 + 14n^3 + 4n^2 - 29n - 30}$$

$$\underline{-4n^4 + 10n^3}$$

$$4n^3 + 4n^2 - 29n - 30$$

$$\underline{-4n^3 + 10n^2}$$

$$-6n^2 - 29n - 30$$

$$\underline{-6n^2 - 15n}$$

$$-14n - 30$$

$$\underline{-14n - 35}$$

$$5$$

$$b^2+0b-1 \overline{) 16b^4 - 25b^3 + 0b^2 + b - 2}$$

$$\underline{-16b^4 + 0b^3 - 16b^2}$$

$$-25b^3 + 16b^2 + b - 2$$

$$\underline{-25b^3 + 0b^2 + 25b}$$

$$16b^2 - 24b - 2$$

$$\underline{16b^2 + 0b + 16}$$

$$-24b + 14$$

Divide using synthetic division

5)  $(7x^3 + 17x^2 + x - 14) \div (x + 1)$

6)  $(3n^3 + 30n^2 + 70n + 45) \div (n + 7)$

$$-1 \begin{array}{r|rrrr} 7 & 17 & 1 & -14 \\ & \downarrow & -7 & -10 & 9 \\ \hline & 7 & 10 & -9 & -5 \end{array}$$

$$-7 \begin{array}{r|rrrr} 3 & 30 & 70 & 45 \\ & \downarrow & -21 & -63 & -49 \\ \hline & 3 & 9 & 7 & -4 \end{array}$$

$$7x^2 + 10x - 9 - \frac{5}{x+1}$$

$$3n^2 + 9n + 7 - \frac{4}{n+7}$$

Find all zeros.

7.)  $f(x) = x^3 - x^2 - 7x + 15$

8.)  $f(x) = x^3 + 2x^2 - x - 2$

$$-3 \begin{array}{r|rrrr} 1 & -1 & -7 & 15 \\ & \downarrow & +3 & 12 & -15 \\ \hline & 1 & -4 & 5 & 0 \end{array} \quad \boxed{-3, 2 \pm i}$$

$$1 \begin{array}{r|rrrr} 1 & 2 & -1 & -2 \\ & \downarrow & 1 & 3 & 2 \\ \hline & 1 & 3 & 2 & 0 \end{array} \quad \boxed{1, -1, -2}$$

$$x^2 - 4x + 5 = 0$$

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

$$\frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(5)}}{2(1)} = \frac{4 \pm \sqrt{16-20}}{2} = \frac{4 \pm \sqrt{-4}}{2} = \frac{4 \pm 2i}{2} = 2 \pm 1i$$

$$= \frac{4 \pm \sqrt{16-20}}{2} = \frac{4 \pm \sqrt{-4}}{2} = \frac{4 \pm 2i}{2} = 2 \pm 1i$$

State all the possible rational zeros.

9.)  $f(x) = 5x^4 - 36x^2 - 81$

$1, 5, 1, 3, 9, 27, 81$

$$\pm 1, \pm 3, \pm 9, \pm 27, \pm 81, \pm \frac{1}{5}, \pm \frac{3}{5}, \pm \frac{9}{5}, \pm \frac{27}{5}, \pm \frac{81}{5}$$

Simplify. Your answer should contain only positive exponents.

10)  $x^{-4}y^4 \cdot x^2y^{-3}$   $x^{-2}y^1$   $\boxed{\frac{y}{x^2}}$

11)  $m^4n^4 \cdot m^{-4}n^2$   $m^0n^6$   $\boxed{n^6}$

12)  $(2x^{-2}y^{-1})^4$   $2^4x^{-8}y^{-4}$   $\boxed{\frac{16}{x^8y^4}}$

13)  $(2x^{-2}y^3)^{-1}$   $2^{-1}x^2y^{-3}$   $\boxed{\frac{x^2}{2y^3}}$

14)  $\frac{4u^4}{u^2v^{-3}}$   $\boxed{4u^2v^3}$

15)  $\frac{2y^7}{x^4y^{-3}}$   $\boxed{2y^3}$

Solve

$-1, 1$

16)  $x^6 - 1 = 0$

17)  $x^6 + 3x^4 - x^2 - 3 = 0$

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

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

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

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

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

$\frac{1 \pm \sqrt{1^2 - 4(1)(1)}}{2(1)} = \frac{1 \pm i\sqrt{3}}{2}$   $\frac{-1 \pm \sqrt{(-1)^2 - 4(1)(1)}}{2(1)} = \frac{-1 \pm i\sqrt{3}}{2}$

$\pm i\sqrt{3} \pm i \pm 1$

Factor each completely.

18)  $125 - 8x^3$

19)  $27u^3 + 64$

$(5-2x)(25+10x+4x^2)$

$(3u+4)(9u^2-12u+16)$

Graph the function. Complete the table. Identify and label the local maximums and minimums and the zeros.

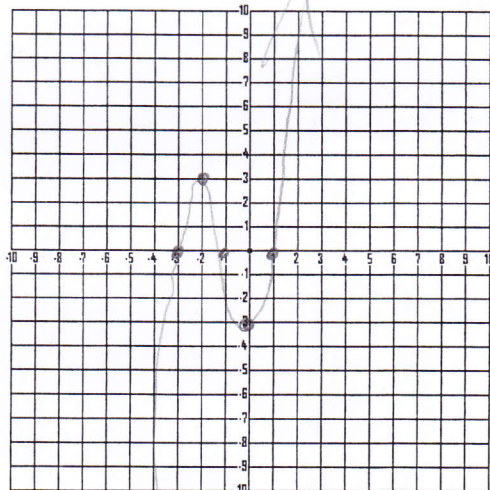
20.  $f(x) = (x-1)(x+1)(x+3)$

-4	-3	-2	-1	0	1	2		
-15	0	3	0	-3	0	15		

Local max  $(-2, 3)$

Local min  $(0, -3)$

Zeros  $-3, -1, 1$



x	y
-4	$(-5)(-3)(-1) = -15$
-2	$(-3)(-1)(1) = 3$
0	$(-1)(1)(3) = -3$
2	$(1)(3)(5) = 15$

Describe the end behavior of each function.

21.  $f(x) = -x^5 + 6x^4 - 5x^2 + 9$   
 as  $x \rightarrow +\infty$ , then  $y \rightarrow -\infty$   
 as  $x \rightarrow -\infty$ , then  $y \rightarrow +\infty$

22.  $f(x) = 5x^4 - x^3 + 9x - 2$   
 as  $x \rightarrow +\infty$ , then  $y \rightarrow +\infty$   
 as  $x \rightarrow -\infty$ , then  $y \rightarrow +\infty$