2g.) $h(x) = 15x^4 - x^2 - 2$

Quadratic form

$0 = (3x^2 + 1)(5x^2 - 2)$

$x^2 = \sqrt{\frac{-1}{3}}$

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

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

$x^2 = \sqrt{\frac{2}{5}\frac{\sqrt{5}}{\sqrt{5}}}$

$x = \pm \frac{\sqrt{10}}{5}$

c.) $f(x) = x^4 - x^3 - x^2 - x - 2$

$\pm 1, \pm 2$

$\{-1, 2, \pm i\}$

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

$\underline{x^3 - 2x^2} + \underline{x - 2} = 0$

$(x^2 + 1)(x - 2) = 0$

$x = \pm i \qquad x = 2$

3d.) $\underbrace{3\,(\text{mult. of } 2)}$, $1+i$

$1-i$ Sum: 2

Product: 2

$(x-3)^2 \neq x^2+9$

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

$$(x^2-6x+9)(x^2-2x+2)$$

	x^2	$-2x$	2
x^2	x^4	$-2x^3$	$2x^2$
$-6x$	$-6x^3$	$12x^2$	$-12x$
9	$9x^2$	$-18x$	18

$$\boxed{f(x) = x^4 - 8x^3 + 23x^2 - 30x + 18}$$

C. $-\frac{2}{3}$, $\sqrt{5}, -\sqrt{5}$

Sum: 0

product: -5

$y = (3x+2)(x^2-5)$

$(x-\sqrt{5})(x+\sqrt{5})$

5a) $f(x) = (x^2 - 1)(x - 2)$

$\pm 1, 2$

$\pm(\qquad\qquad)$

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

2b.) $81x^4 - 1$

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

Sketching Polynomial Functions

<u>To sketch a polynomial function you will need...</u>

1. x-intercepts

2. y-intercept

3. end behavior

4. table of values

ex: Sketch.

a) $y = 9x^3 + 18x^2 - x - 2$

a.) x-int.

$0 = (3x-1)(3x+1)(x+2)$

$x = \frac{1}{3}, \frac{-1}{3}, -2$

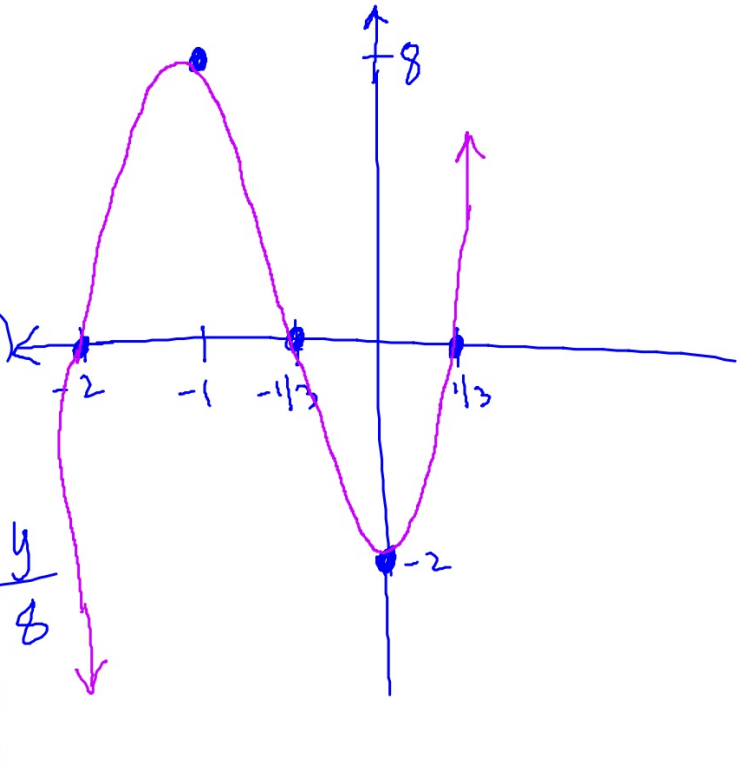
(all crossing)

b) y-int: -2

c) $x \to -\infty \quad y \to -\infty$

$x \to \infty \quad y \to \infty$

x	y
-1	8



ex: Sketch.

b) $f(x) = -x^4 + 6x^2 - 5 = -(x^4 - 6x^2 + 5)$

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

$-x^2$

a.) x-int.

$\pm 1, \pm\sqrt{5}$

All crossing

b.) y-int.

$(0, -5)$

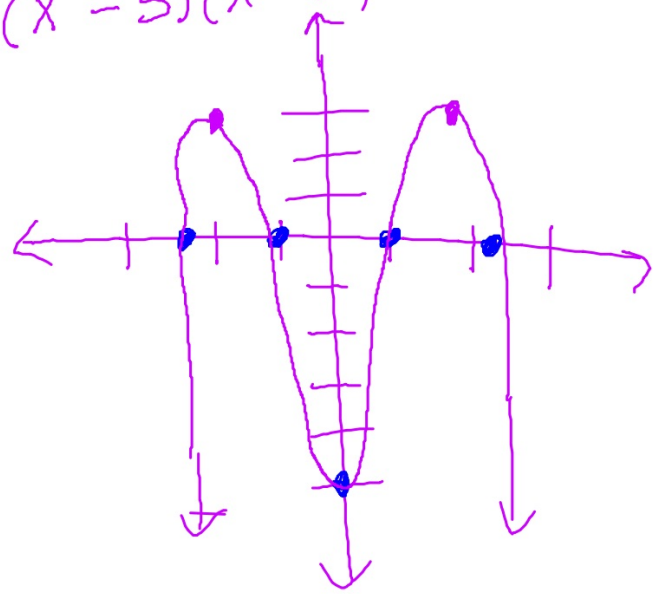
c.) end behavior

$x \to -\infty \quad y \to -\infty$

$x \to \infty \quad y \to -\infty$

d.)

x	y
-2	3
2	3

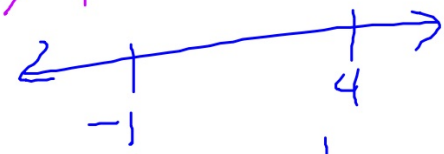


ex: Sketch.

c) $f(x)=\frac{1}{5}(x+1)^2(x-2)(x-4)$

a. $x=-1, 2, 4$

mult. of 2



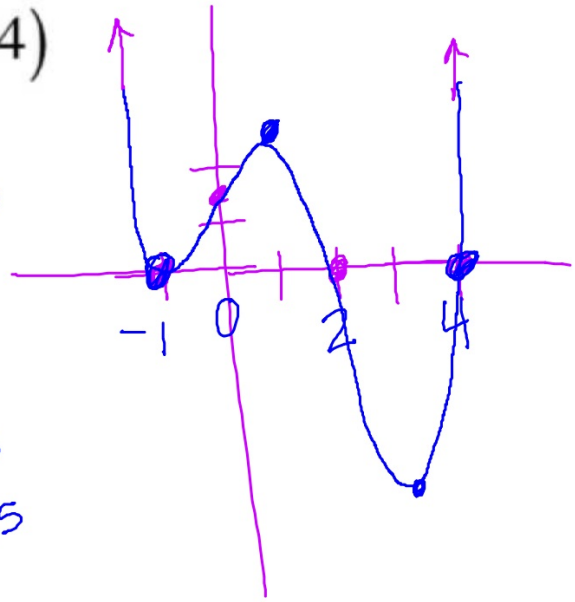
b. $8/5 = y$ int

$(0, 8/5)$

x	y
1	12/5
3	-16/5

c. $x \to -\infty \; y \to \infty$

$x \to \infty \; y \to \infty$



ex: Sketch.

d) $y = -x^3 + 1 = -(x^3 - 1) = -(x-1)(x^2 + x + 1)$

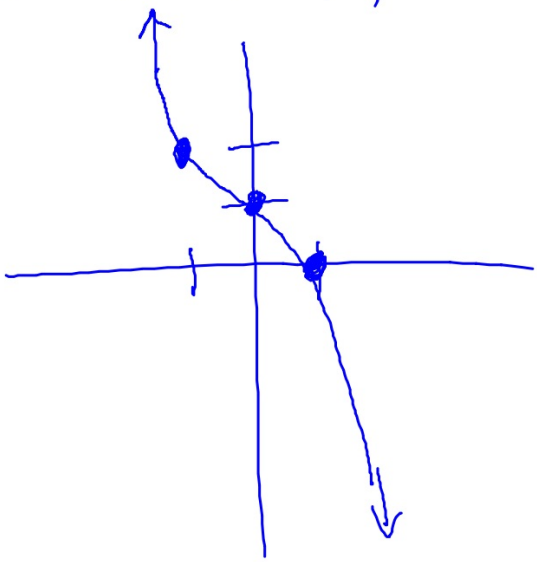
a. x-int:
$x = 1$ $(1, 0)$

b. yint $(0, 1)$

c. $x \to -\infty$ $y \to \infty$
$x \to \infty$ $y \to -\infty$

x	y
-1	+2

$-(-1)^3 + 1$



ex: Sketch.

e) $g(x) = x^3 - 3x^2 + 2$

ex: Sketch a polynomial function with the given characteristics.

- $x \to -\infty, \quad y \to -\infty$

  $x \to \infty, \quad y \to \infty$
- 1 negative crossing zero
- 1 positive bouncing zero

REVIEW

ex: Solve.

a) $3-81x^3=0$

REVIEW

ex: Solve.

b) $x^3 - 8x^2 + 5x + 14 = 0$

REVIEW

ex: Solve.

c) $4x^4 + 34x^2 + 16 = 0$

REVIEW

ex: $f(x) = x^3 - 7x^2 + 7x$

Find $5f(4)$ using synthetic substitution.

REVIEW

ex: $f(x) = x^3 - 7x^2 + 9x + 5$

If $f\left(1+\sqrt{2}\right) = 0$ find all zeros of f(x).

REVIEW

ex: Simplify.

$$\frac{\left(3x^2y^4z^0\right)^{-1}}{\left(2xy^0z\right)^{-2}\left(3x^{-1}y^2\right)}$$

REVIEW

ex: Sketch.

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

REVIEW

ex: $7^8 - 5x^4 - 6x$

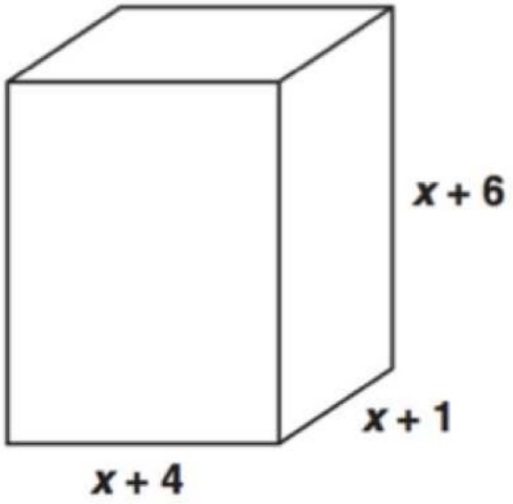
a) Write in standard form.

b) Classify by degree and number of terms.

c) State the end behavior.

REVIEW

ex: **What is the volume of the figure below?**



REVIEW

$$x^3 + 7x^2 - 7x + 6 + \frac{4}{2x+7}$$

ex: $2x + 7 \overline{\big) 2x^4 + 21x^3 + 35x^2 - 37x + 46}$

REVIEW

ex:

Which polynomial represents $(3x^2 + x - 4)(2x - 5)$?

A $6x^3 - 13x^2 - 13x - 20$

B $6x^3 - 13x^2 - 13x + 20$

C $6x^3 + 13x^2 + 3x - 20$

D $6x^3 + 13x^2 + 3x + 20$

REVIEW

ex:

$$\left(-2x^2+6x+1\right)-2\left(4x^2-3x+1\right)=$$

A $6x^2-1$

B $-10x^2-1$

C $6x^2+12x-1$

D $-10x^2+12x-1$

REVIEW

ex:

$$8a^3 + c^3 =$$

A $(2a + c)(2a + c)(2a + c)$

B $(2a - c)(4a^2 + 2ac + c^2)$

C $(2a - c)(4a^2 + 4ac + c^2)$

D $(2a + c)(4a^2 - 2ac + c^2)$

REVIEW

ex:

What is the simplest form of

$$\frac{5x^3y + 20x^2y^2 + 20xy^3}{5xy}?$$

A $(x+2)^2$

B $(x+2y)^2$

C $x^2 + y^2$

D $x^2 + 4y^2$