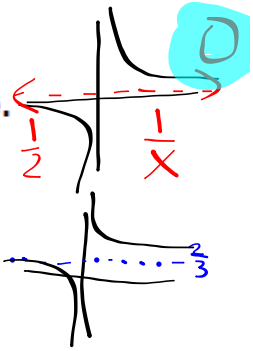
Notes

$$f(x) = \frac{ax^n + \ldots}{bx^m + \ldots}$$ ← nth degree polynomial ← mth degree polynomial

1. If $n < m$ (proper), then the x-axis is the horizontal asymptote.



2. If $n = m$, then the horizontal asymptote is the line $y = \frac{a}{b}$

$\frac{2x}{3(x+1)} = y = \frac{2}{3}$

3. If $n > m$, then there is no horizontal asymptote. (There is a slant diagonal or oblique asymptote.)

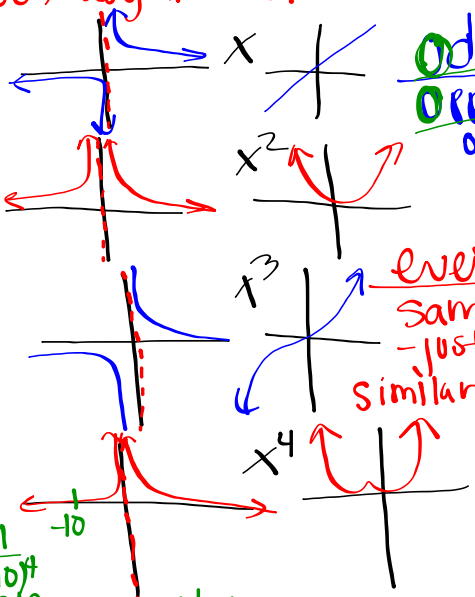
Odd/even asymptotes.

A. $\frac{1}{x^1}=0$

B. $\frac{1}{x^2}=0$

C. $\frac{1}{x^3}=0$

d. $\frac{1}{x^4}=0$



$\oplus = \frac{1}{(-10)^4}$

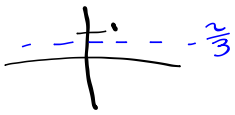
graphs are always $\oplus$, unless there is a negative out front!

Odd exponents
Opposite directions on each side of the asymptote

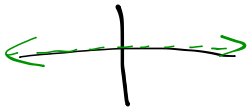
even exponents (in the denominator)
same direction
-just like "even stevens"
similar to a ↑↑ shape, up on both sides.

~~HA~~ end behavior

same / same $\frac{2x^2}{3x^2} = \frac{2}{3} = y$



small / big $\frac{x}{x^2}$ $y = 0$



big / small $\frac{x^2}{x^1}$

No Horizontal, but.....

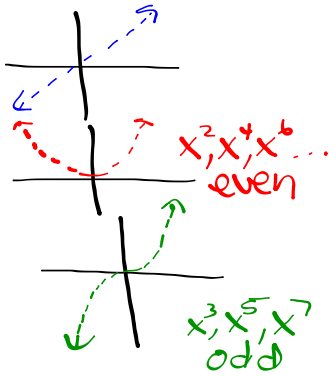
DIVIDE. Approaches, what is left after division!

$\frac{x^7}{x^4} = x^3$

$x \int \frac{x}{x^2}$ $y = x$

$x \int \frac{x^2}{x^3}$ $y = x^2$

$x^4 \int \frac{x^3}{x^7}$ $y = x^3$



Quick notes

$\frac{0}{\#} = 0$ $\frac{\#}{0}$ = undefined

Chapter 3 and 4 Review

Period__

Multiply. F.O.I.L

1) $(2a-7)(a+5)$

$2a^2+10a-7a-35$

$2a^2+3a-35$

2) $(2v-7)(5v-5)$

3) $(4x+4y)(8x-4y)$

4) $(3m-8n)(2m+3n)$

Remainder Theorem: Evaluate each function at the given value. Yes/ No, is it a root?

5) $f(a)=a^3-5a^2+3a+3$ at $a=2$

$(2)^3-5(2)^2+3(2)+3=0$? NO!

6) $f(a)=a^3-3a^2-10a-5$ at $a=-2$

Find all zeros. State whether it would bounce or pass at each zero(multiplicity).

7) $f(x)=(x-5)(x-2)(x+2)$

5 2 -2

8) $f(x)=(x+3)(x-1)(x+1)$

9) $f(x)=x(x+1)(x^2+1)=0$

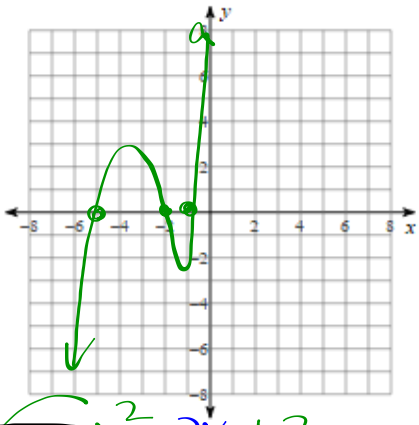
0 -1 $\sqrt{x^2}=\sqrt{-1}$

$x=\pm i$

10) $f(x)=(x-1)(x+1)(x-2)(x+2)(x^2+4)$

Use long division to factor completely, then graph.

11)



$x+5\overline{)x^3+8x^2+17x+10}$

x^2+3x+2

$-x^3-5x^2$

$3x^2+17x+10$

$-3x-15x$

$2x+10$

$-2x+10$

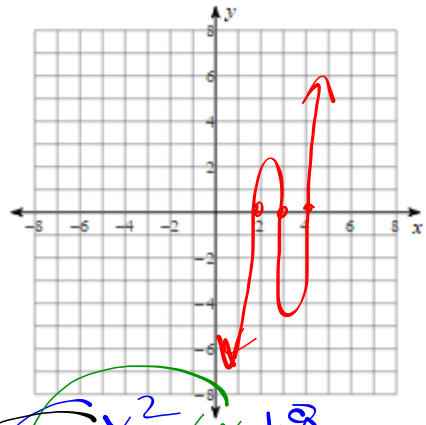
0

2, 1, 2, 3

$(x+2)(x+1)(x+5)$

$-2, -1, -5$

12)



$x-3\overline{)x^3-9x^2+26x-24}$

x^2-6x+8

$-x^3+3x^2$

$-6x^2+26x-24$

$+6x^2-18x$

$8x-24$

$8x-24$

0

8, -4, -2, -6

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

4, 2, 3

Simplify each expression.

Typo

13) $\frac{4}{3x+18}+\frac{4}{3x}$

$\frac{4+4x+24}{3(x+6)} = \frac{4x+28}{3(x+6)}$

$\frac{4(x+7)}{3(x+6)}$

14) $\frac{4}{3}+\frac{5m}{3m^2-9m}$

$\frac{4m^2-12m+5m}{3(m^2-3m)} = \frac{4m^2-7m}{3(m^2-3m)}$

$\frac{m(4m-7)}{3m(m-3)}$

15) $\frac{7}{n-6}+\frac{6}{n-3}$

160

4 40
2 80
20 8
10 16

160
-7

16) $\frac{n-5}{n+2}-\frac{5n}{n+8}$

$\frac{n^2+3n-40-(5n^2+10n)}{(n+8)(n+2)} = \frac{-4n^2-7n-40}{(n+8)(n+2)}$

17) $\frac{a^2-5a-50}{a^2+6a+5}$

18) $\frac{p^2+7p+12}{3p^3+9p^2}$

19) $\frac{5n^2}{35n^3-20n^2}\cdot\frac{49n-28}{10}$

20) $\frac{1}{8x}\div\frac{x+8}{8x^2+16x}$

21) $\frac{x^2+4x-21}{x^2+7x-30}\times\frac{x^2+12x+20}{x^2-x-6}$

30X

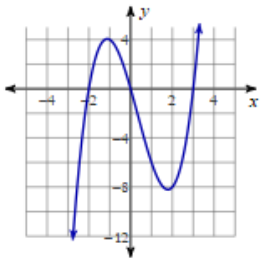
22) $\frac{3x^2-7x+4}{4x^2-x-3}$

Match the following functions with the cooresponding graph. bounce!

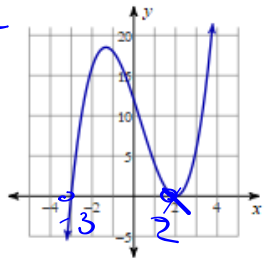
23) i. _____ $x(x+2)(x-3)$ ii. B $(x-2)^2(x+3)$

ii. _____ $(x-2)(x+3)^2$ iv. _____ $x^2(x-3)$

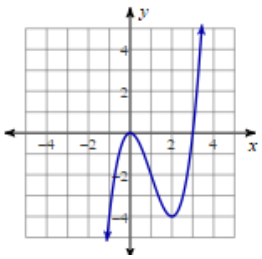
A)



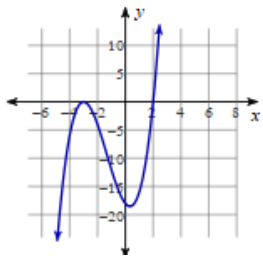
B)



C)



D)



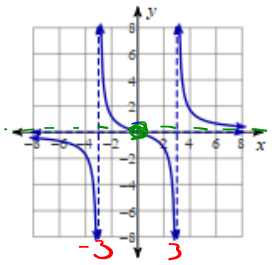
24) i. C $\frac{1}{(x-3)(x+3)}$ none $=0$ 3 -3 bounce

ii. A $\frac{3x}{(x-3)(x+3)}$ $=0$ 3 -3

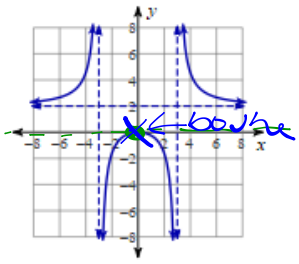
iii. B $\frac{2x^2}{(x-3)(x+3)}$ $=0$ 3 -3

iv. D $\frac{(x+1)^2}{(x-3)(x+3)}$ -1 3 -3

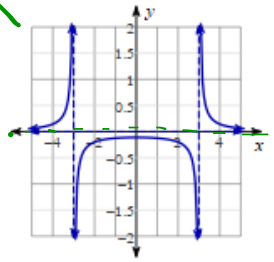
A)



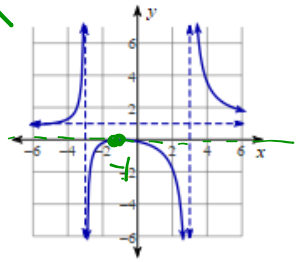
B)



C)



D)



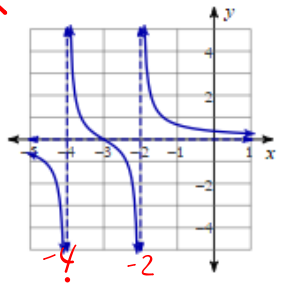
25) i. ____ $\frac{2}{(x-2)^2(x+3)}$

ii. A $\frac{x+3}{x^2+6x+8}$ $(x+2)(x+4)$ -2 -4 8/2 4/b

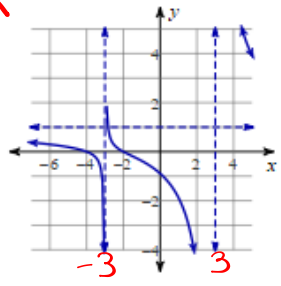
iii. ____ $\frac{3}{x^2-3x-10}$

iv. B $\frac{x^2+6x+8}{(x-3)(x+3)=0}$ 3 -3

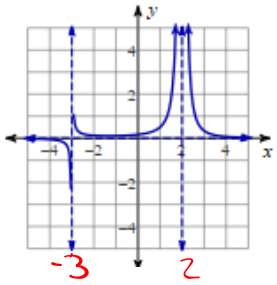
A)



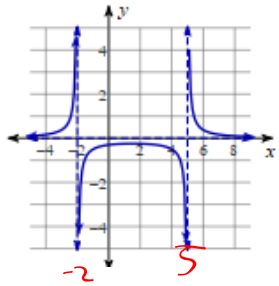
B)



C)



D)



26) Determine the features and graph:

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

$x+1=0$

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

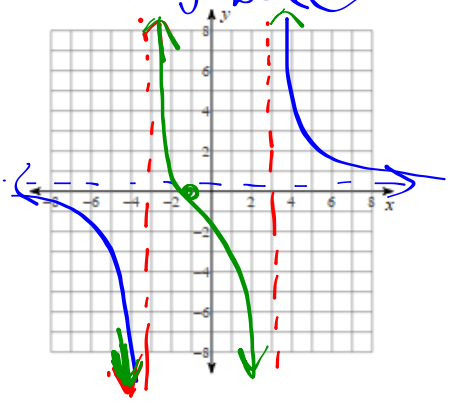
3 -3

x-intercept(s): -1

Vertical Asymp.: $3, -3$

End Behavior Asymp.: $\to 0$ $\frac{x}{x^2}$

Horizontal asymptote



27) Determine the features and graph:

$$\frac{x+2}{x^2+6x+5}$$

x-intercept(s): _____

Vertical Asymp.: _____

End Behavior Asymp.: 0