10.) $g(x) = 6x^2 - 3x^3$

$g(x) = \underline{3x^2}(2 - x)$

$x = 0$
bance

$x = 2$
cross

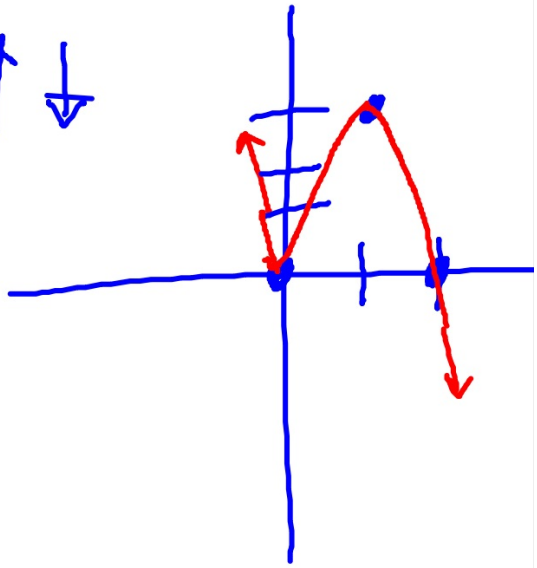
yint: $(0, 0)$

e.b: ↑↓

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

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

x	y
0	0
2	0
1	3



7.) $y = -\frac{1}{5}x(x-4)^2$

degree: 3

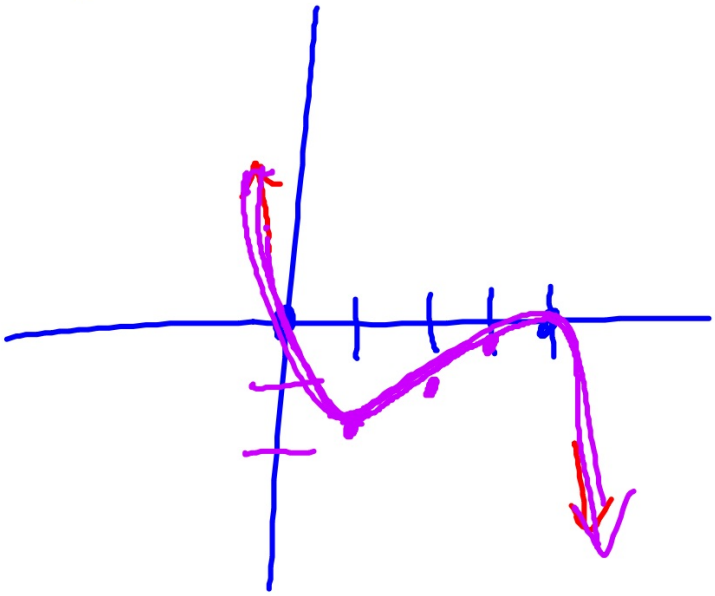
odd; $-$ l.c.

$\uparrow\downarrow$

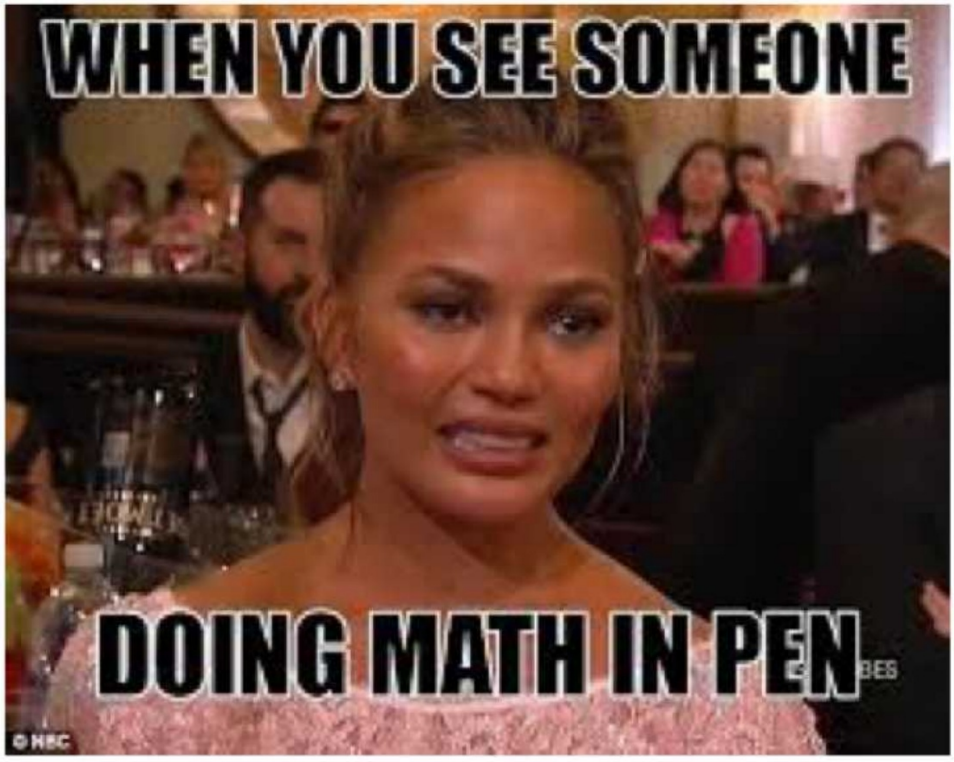
$x=0$
cross

$x=4$
bance

x	y
0	0
4	0
3	$-3/5$
2	$-8/5$
1	$-9/5$



Simplifying Rational Expressions



ex: True or False?

a) $\frac{x}{(x+3)} = \frac{1}{3}$ false

$\frac{12}{18} = \frac{\cancel{6} \cdot 2}{\cancel{6} \cdot 3}$

$\frac{7}{7+3} = \frac{1}{3}$

b) $\frac{(x+4)}{(x-8)} = -\frac{1}{2}$ false

c) $\frac{\cancel{x}}{\cancel{x}(x+1)} = \frac{1}{(x+1)}$ true

Rational Expression

A rational expression has the form $\frac{f(x)}{g(x)}$ where $f(x)$ and $g(x)$ polynomials and $g(x) \neq 0$.

A rational expression is in simplified form when its numerator and denominator have NO common factors.

$$\frac{x^3+1}{x^2+1} \qquad \frac{5}{x+1}$$

Simplify and state the excluded values.

a) $\dfrac{50a}{25a^2 - 25a}$

$$\frac{\overset{2}{\cancel{50a}}}{\underset{1}{\cancel{25a}}(a-1)}$$

$$\frac{2}{a-1}$$

Write what makes the fraction undefined

$25a(a-1) = 0$

$25a = 0$ $\quad$ $a - 1 = 0$

$a = 0$ $\quad$ $a = 1$

b) $\dfrac{56x + 16}{64}$

$$\frac{\overset{1}{\cancel{8}}(7x+2)}{\underset{8}{\cancel{64}}}$$

$$\frac{(7x+2)}{8}$$

No excluded values

(the denominator is a constant)

c) $$\frac{10x^2 + 16x}{6x^2 + 8x}$$

$$\frac{\cancel{2x}(5x+8)}{\cancel{2x}(3x+4)}$$

$$\frac{(5x+8)}{(3x+4)}$$

exc. values

$$2x(3x+4)=0$$

$$2x=0 \qquad 3x+4=0$$

$$x=0 \qquad x=-\frac{4}{3}$$

d)

$$\frac{3x+18}{x^2-36}$$

$$\frac{3\cancel{(x+6)}}{\cancel{(x+6)}(x-6)}$$

$$\frac{3}{x-6}$$

Excl. values

6, −6

e) $\dfrac{2n^2 - 2n - 12}{7n^2 - 16n - 15}$

$$\frac{2(n^2 - n - 6)}{(7n+5)(n-3)}$$

$$\frac{2(n+2)\cancel{(n-3)}}{(7n+5)\cancel{(n-3)}}$$

$$\frac{2(n+2)}{(7n+5)}$$

excluded values

$(7n+5)(n-3)=0$

$-\frac{5}{7}$, 3

ex: Simplify.

f) $\dfrac{2x^2+10x}{3x^2+16x+5}$

$$\frac{2x\cancel{(x+5)}}{(3x+1)\cancel{(x+5)}}$$

$$\frac{2x}{3x+1}$$

E.V.

$-\frac{1}{3}, -5$

ex: Simplify.

g) $\dfrac{5x^3+20x^2+15x}{x^3-6x^2-9x+54}$

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

$$\frac{5x(x^2+4x+3)}{(\quad)(\quad)(\quad)}$$

$$\frac{5x(\cancel{x+3})(x+1)}{(\cancel{x+3})(x-3)(x-6)}$$

$$\frac{5x(x+1)}{(x-3)(x-6)}$$

excluded value

$3, -3, 6$

ex: Simplify.

h) $\dfrac{x^2-4}{x^3-8}$

$$\frac{(x+2)\cancel{(x-2)}}{\cancel{(x-2)}(x^2+2x+4)}$$

$$\frac{x+2}{x^2+2x+4}$$

E.V.

$x-2=0$ $\boxed{x=2}$

SOAP: The trinomial does NOT factor AND the trinomial will give you imaginary solutions.

ex: Simplify.

i) $\dfrac{2x^2-6x-36}{4x^2-16x+12}$

$$\frac{\overset{1}{\cancel{2}}(x-6)(x+3)}{\underset{2}{\cancel{4}}(x-3)(x-1)}$$

E.V.

$x = 3, 1$

$$\frac{(x-6)(x+3)}{2(x-3)(x-1)}$$