Domain: (Def'n): The set of allowable inputs.
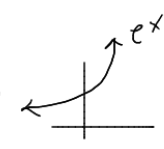
what's <u>not</u> allowed?
- Division by 0, (why? $\frac{5}{0} = w$ if   then $5 = 0 \cdot w = 0$)
- Take square root of a negative (or even root)

(why? If $\sqrt{-1} = i$ then $i \cdot i = -1$

but $(-1)(-1) = {}^{+}1$

$(1)(1) = 1$)

- log a negative #.   (why? If $\ln(-1) = w$

then $e^{\ln(-1)} = e^{w}$

$-1 = e^{w}$ ← impossible

$e \approx 2.718$

FACTS —————————————————

1. Domain of any polynomial is $(-\infty, \infty)$

eg $5x^3 + x + 1$ (No division of x)

   No sq. roots)

2. Domain of $f(x) = \dfrac{g(x)}{h(x)}$ w/ $\overset{h(x)}{g(x)}$ = poly

is all x s.t. $h(x) \neq 0$.

eg. $f(x) = \dfrac{3x^2 + x + 1}{(5x^2 - 16x + 72)}$

$x = \dfrac{16 \pm \sqrt{16^2 - 4 \cdot 5 \cdot 72}}{10} = $ ONE

Find roots (where poly $=0$) of

$5x^2 - 16x + 72 = 0$

solve, exclude sol'n

Domain of ———— is $(-\infty, \infty)$

1. Study Guide posted Tonight
2. WeBWork closes Monday, 8 am.
3. Exam: next Friday

#33 $f(x) = x^3 + 1$ $g(x) = x - 1$

$(f + g)(x) = $ [   ] , $f(x) + g(x)$

$(f - g)(x) = $ [   ] , $f(x) - g(x)$

$(fg)(x) = $ [   ] , $f(x) \cdot g(x)$

$(f/g)(x) = $ [   ] , $\dfrac{f(x)}{g(x)}$

$(f \circ g)(x) = $ [   ] , and $f(g(x))$

$(g \circ f)(x) = $ [   ] . $g(f(x))$

$(f + g)(x) = \left(x^3 + 1\right) + \left(x - 1\right) = x^3 + x$

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

$(f \circ g)(x) = f(g(x)) = (g(x))^3 + 1 = (x-1)^3 + 1$

$f(\odot) = \odot^3 + 1$

$\qquad = (x-1)(x-1)(x-1) + 1$

$\qquad = (x-1)(x^2 - 2x + 1) + 1$

$\qquad = x(x^2 - 2x + 1) - 1(x^2 - 2x + 1) + 1$
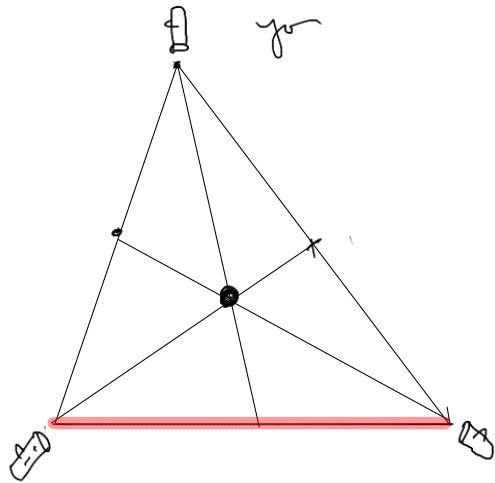
$\qquad = x^3 - 2x^2 + x - x^2 + 2x - 1 + 1$

$\qquad = x^3 - 3x^2 + 3x$
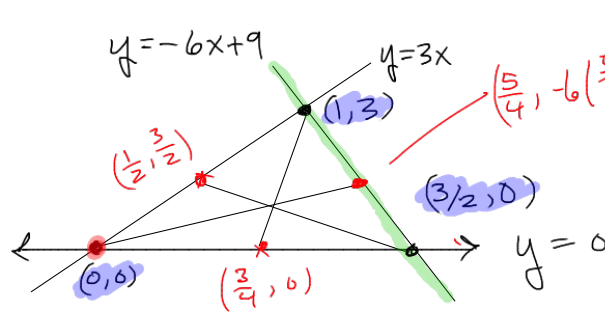
$(g \circ f)(x) = g(f(x)) = f(x) - 1$

$\qquad = (x^3 + 1) - 1 = \boxed{x^3}$

Idea:

Centroid of a Triangle
3 medians intersect @ Centroid
line b/w vertex & midpoint
of opposite edge

Exercise: The graphs of $y = 0$, $y = 3x$ & $y = -6x + 9$ form a $\triangle$.

$y = -6x + 9$
$y = 3x$
$(1,3)$
$\left(\frac{5}{4}, -6\left(\frac{5}{4}\right) + 9\right)$
$\left(\frac{1}{2}, \frac{3}{2}\right)$
$(3/2, 0)$
$y = 0$
$(0,0)$
$\left(\frac{3}{4}, 0\right)$

$-6x + 9 = 0$

$x = \frac{9}{6} = \frac{3}{2}$

$-6x + 9 = 3x$

$1 = x$

$\left(\frac{\frac{3}{2} + \frac{3}{2}}{2}, \frac{3 + 0}{2}\right)$

$\dfrac{\frac{5}{2}}{\frac{2}{1}} = \frac{5}{2} \cdot \frac{1}{2}$

$\dfrac{5}{4}$

① Find the vertices
② Find the midpts b/w vertices
③ Find the medians
④ Find the centroid (where medians intersect)
(where equations equal each other)