DIVIDING POLYNOMIALS

$$\frac{x^5 - 2x^2 - 27}{x - 2}$$

$$9\,\overline{)\,388}\quad = 43\tfrac{1}{9}$$

-36

28

-27

- * Dividing Polyn.
- * Function Ops
- * Inverse Func.

$$x^4 + 2x^3 + 4x^2 + 6x + 12 - \frac{3}{x-2}$$

$$x - 2\,\overline{)\,x^5 + 0x^4 + 0x^3 - 2x^2 + 0x - 27}$$

$-\ \cancel{x^5} + 2x^4$

$2\cancel{x^4} + 0x^3$

$-\ 2\cancel{x^4} + 4x^3$

$4x^3 - 2x^2$

$-\ 4x^3 + 8x^2$

$6x^2 + 0x$

$-\ 6x^2 + 12x$

$12x - 27$

$-\ 12x + 24$

-3

Change the signs!

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Synthetic Division — only works if dividing by $x + \#$ or $x - \#$

$$\frac{x^5 - 2x^2 - 27}{x - 2}$$

Switch sign

2	1	0	0	-2	0	-27
+		2	4	8	12	24
	1	2	4	6	12	-3

$$1x^4 + 2x^3 + 4x^2 + 6x + 12 - \frac{3}{x-2}$$

Start by dropping the first number below the line

Function Operations

$f(x) = x^2 + 3x + 2 \qquad g(x) = 3x^2 - x + 7$

$$f(-3) = (-3)^2 + 3(-3) + 2$$
$$= 9 - 9 + 2$$
$$= 2$$

$$(f+g)(x) = x^2 + 3x + 2 + 3x^2 - x + 7$$
$$= 4x^2 + 2x + 9$$

$$(f+g)(1) = 4(1)^2 + 2(1) + 9$$
$$= 4 + 2 + 9$$
$$= 15$$

$K(x) = 3x + 2 \qquad m(x) = x^2 - 2x + 4$

$$(Km)(x) = (3x+2)(x^2 - 2x + 4)$$

$$\left(\frac{m}{K}\right)(x) = \frac{x^2 - 2x + 4}{3x + 2}$$

Composition of Functions – Function in a function

$f(x) = 3x + 2$ $\quad g(x) = x^2 - 2x + 4$ $\quad h(x) = \dfrac{3x^2+2}{x^2-1}$ $\quad K(x) = \sqrt{2x+1}$

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

f of g of x

$f[g(2)]$

$f[4]$

$g(2) = 2^2 - 2(2) + 4$
$= 4 - 4 + 4$
$= 4$

$f(4) = 3(4) + 2 = \boxed{14}$

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$f(x) = 3x + 2 \qquad g(x) = \boxed{x^2 - 2x + 4} \qquad h(x) = \dfrac{3x^2 + 2}{x^2 - 1} \qquad K(x) = \sqrt{2x+1}$

$$(f \circ g)(x)$$

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

$$= 3x^2 - 6x + 12 + 2$$

$$= 3x^2 - 6x + 14$$

$$(h \circ K)(x)$$

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

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

$$= \frac{6x + 3 + 2}{2x} = \boxed{\frac{6x+5}{2x}}$$

Function - Each x-coord. is paired with exactly one y-coord.

- vertical line test
- x-coord. should not repeat

No

$f = \{(x, y)\}$ $\quad f = \{(-2, 3)\ (4, 2)\ (7, -4)\}$

$f^{-1} = \{(y, x)\}$ $\quad f^{-1} = \{(3, -2)\ (2, 4)\ (-4, 7)\}$

Steps for finding inverse:

1) Switch the x + y variables
2) Solve for y.

$\overset{y}{\cancel{f(x)}} = 4x - 7$

$x = 4y - 7$

$\frac{x+7}{4} = \frac{\cancel{4}y}{\cancel{4}}$

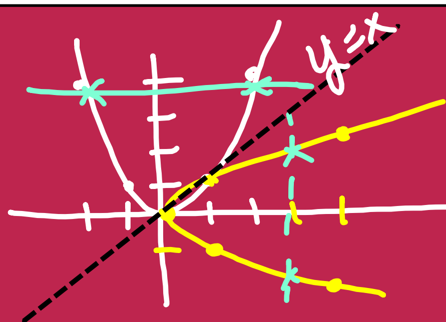
$\frac{x+7}{4} = f^{-1}$

$\overset{y}{\cancel{f(x)}} = x^2 + 4$

$x = y^2 + 4$

$\sqrt{x - 4} = \sqrt{y^2}$

$\boxed{\pm\sqrt{x-4} = y}$



f	
0	0
1	1
2	4
-1	1
-2	4

f^{-1}	
0	0
1	1
4	2
1	-1
4	-2

Original func. must pass horiz. line test in order for the inverse to pass the vertical line test.

The graphs of all function + their inverses will reflect over the line $y=x$.

Given two func f + g, are they inverses?

If they are inverses, $f \circ g = x$

or $g \circ f = x$