Warm Up Regents Question 6/2016:

If $g(c) = 1 - c^2$ and $m(c) = c + 1$, then which statement is NOT true?

1) $g(c) \cdot m(c) = 1 + c - c^2 - c^3$

2) $g(c) + m(c) = 2 + c - c^2$

3) $m(c) - g(c) = c + c^2$

$\boxed{4)}$ $\frac{m(c)}{g(c)} = \frac{-1}{1-c}$

$(1-c^2)(c+1)$

$c+1-c^3-c^2$

$1-c^2+c+1$

$2-c^2+c$

$(c+1)-(1-c^2)$

$c+\cancel{1}-\cancel{1}+c^2$

F-BF.1b: Combine standard function types using arithmetic operations.

Introduction to Functions

relation- a set of ordered pairs (x,y)

function- relation in which no two ordered pairs have the same first element, and every first element in mapped to a second.

x can't Repeat + every x has a y

Regents Practice:
Operation w/ Functions

A manufacturing company has developed a cost model, $C(x)=0.15x^3+0.01x^2+2x+120$, where x is the number of items sold, in thousands. The sales price can be modeled by $S(x)=30-0.01x$. Therefore, revenue is modeled by $R(x)=x\bullet S(x)$. The company's profit, $\boxed{P(x)=R(x)-C(x)}$, could be modeled by

1) ~~$0.15x^3+0.02x^2-28x+120$~~
2) $-0.15x^3-0.02x^2+28x-120$
3) $-0.15x^3+0.01x^2-2.01x-120$
4) $-0.15x^3+32x+120$

$x(30-0.01x)-(0.15x^3+0.01x^2+2x+120)$

$30x-0.01x^2$

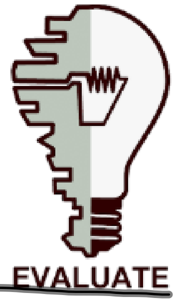
$-.15x^3-2x-0.01x^2-120$

Evaluating Functions

F-BF.1: Write a function that describes a relationship between two quantities

Let f be the set of ordered pairs such that the 2nd element of each pair is one more than twice the first.

$f(x)=1+2x$



a) Write f(x) in terms of x

$f(x)=2x+1$

b) Find f(7)

$f(7)=2(7)+1=15$

c) Find f(-3)

$f(-3)=2(-3)+1=-5$

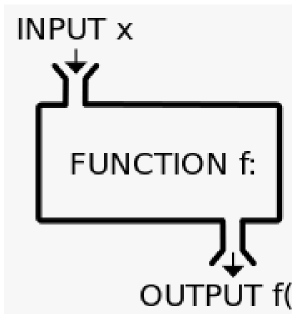
Whatever is in parenthesis Replaces x

d) Find f(b)

$f(b)=2(b)+1$

e) find f(x-3)

$f(x-3)=2(x-3)+1$
$=2x-6+1$
$=2x-5$



INVERSE

F-BF.4: Find inverse functions.

Inverse Functions

Inverse Operations:
1. $+$ and $-$
2. $\div$ and $\times$
3. $\sqrt{x}$ and x^2
4. $\sqrt[3]{x}$ and x^3

inverse function- Switch x & y, then solve for y

If $f(x)$ is the function, then $\boxed{f^{-1}(x)}$ is the inverse

Example:

Find $f^{-1}(x)$ given $f(x) = 3x^2 + 1$.

$$y=3x^2+1$$

$$x=3y^2+\cancel{1}$$

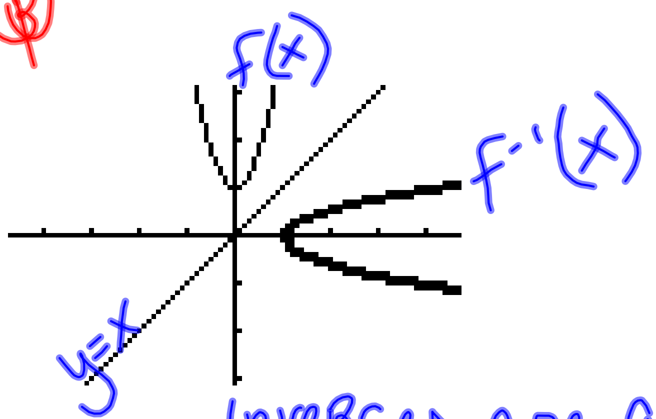
$$-1 \qquad -\cancel{1}$$

$$x-1=3y^2$$

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

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

$$\pm\sqrt{\frac{x-1}{3}}=f^{-1}(x)$$



Inverses are a reflection over $y=x$

Find $g^{-1}(x)$ given the function $\underbrace{g(x)}_{y} = \sqrt{x} + 6$

$y = \sqrt{x} + 6$

$x = \sqrt{y} + 6$

$-6 \qquad -6$

$(x-6)^2 = \cancel{\sqrt{y}}^{\,2}$

$\boxed{(x-6)^2 = g^{-1}(x)}$

PROVE it's the inverse

ORig: $\sqrt{(x-6)^2} + 6$

$x - \cancel{6 + 6}$

x

OR

inv: $(\sqrt{x} + \cancel{6 - 6})^2$

$(\sqrt{x})^2$

x

What is the result both times?

x

IDENTITY FUNCTION:

$y = x$ ★

Homework: p. 166-167 #12-24 multiples of 4

In 11–16, determine if the function has an inverse. If so, list the pairs of the inverse function. If not, explain why there is no inverse function.

12. $\{(1, 4), (2, 7), (1, 10), (4, 13)\}$ **16.** $\{(x, y) : y = x^2 + 2 \text{ for } 0 \leq x \leq 5\}$

In 17–20: **a.** Find the inverse of each given function. **b.** ~~Describe the domain and range of each given function and its inverse in terms of the largest possible subset of the real numbers.~~

20. $f(x) = \sqrt{x}$

In 24–26, sketch the inverse of the given function.

24.