WARM UP

Let $f(x)=x^2$

Find $f(x+2)$

$f(x+2)=(x+2)^2=(x+2)(x+2)=x^2+2x+2x+4$

$=x^2+4x+4$

Jul 31-1:30 PM

Questions about quiz?

- 9 questions: 5 free response, 4 multiple choice

Aug 28-7:45 AM

The Algebra of Functions: Sums, Differences, Products, and Quotients

Let f and g be two functions. The sum $f+g$, the difference $f-g$, the product fg, and the quotient f/g are functions **whose domains are the set of all real numbers common to the domains of f and g**, defined as follows:

$$(f+g)(x)=f(x)+g(x)$$

$$(f-g)(x)=f(x)-g(x)$$

$$(fg)(x)=f(x)g(x)$$

$$\left(\frac{f}{g}\right)(x)=\frac{f(x)}{g(x)},\ g(x)\neq 0$$

Jan 17-11:48 AM

Example

Let $f(x)=x-5,\ g(x)=x^2-1.$

Find their sum, difference, product, and quotient as defined above. Be sure to determine the domain for each function.

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

$(f-g)(x)=x-5-(x^2-1)=x-5-x^2+1=-x^2+x-4$

$(fg)(x)=(x-5)(x^2-1)$

$x^3-x-5x^2+5=x^3-5x^2-x+5$

p. 58: #9 (HW)

$\left(\frac{f}{g}\right)(x)=\frac{x-5}{x^2-1},\ x\neq 1,-1$

$x^2-1=0$

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

$x\neq\pm 1$

Jan 17-11:52 AM

Find $(fg)(2)$ from previous example. Let $f(x)=x-5,\ g(x)=x^2-1.$

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

$g(2)=(2)^2-1=3$

$-3\cdot 3$

-9

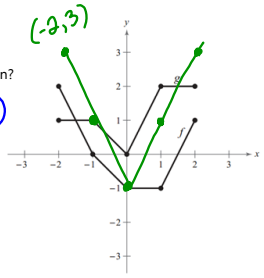
Aug 27-5:00 PM

p. 58, #2:
Graph y=(f+g)(x).

Q: What's the domain of this new function?
A: $(f+g)(x)=f(x)+g(x)$

$y+y$

(-2,3)



p. 58, #1 (HW)

Aug 27-5:04 PM

Composite Functions

Say a computer store is having a sale—either $300 off or 85% off the regular pr

Q: If x is the original price, what are the two sale prices, written as functions?
A: $f(x)=x-300$ $g(x)=.15x$

But, wait, there's more. You bargain and the store gives you an offer you can't r
85% off the regular price, minus $300. Write this as a function.

$(f\circ g)(x)=.15x-300$

We read this as "f of g of x," the composition function.

Definition . The *composition* of the function f with g is denoted by $f\circ g$ and is defined by the equation $(fog)(x)=f(g(x))$.

When working these, **work from the inside out.**

Jun 14-1:12 PM

The domain of $f\circ g$ is the set of all x such that:
(1) x is in the domain of ___g___ and
(2) $g(x)$ is in the domain of ___f___.

$f(g(x))$

Example
Given $f(x)=x^2, g(x)=x+1.$

[A] Find $(f\circ g)(x)$.

$f(g(x))$

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

x^2+2x+1

[B] Find $(g\circ f)(x)$.

$g(f(x))$

$g(x^2)=(x^2)+1$

x^2+1

[C] Find $(f\circ g)(-1)$.

$f(g(-1))$

$f(0)=0$

$f(x)=2x-1$ $g(x)=-4x$

p. 59, #39 (HW)

$f(g(1))$

$f(-4)=-9$

Jun 14-1:17 PM

Q: What were the domains of the previous composition functions?
A:

Find $(fog)(0)$

Aug 27-5:07 PM

For a composition f o g, exclude:

(1) Anything that should not be in the domain of g(x).

(2) Anything that should not be in the domain of the final answer.

Example
Find $(fog)(x)$, *where* $f(x)=\frac{4}{x+2}, g(x)=x-1.$

Then find the domain of fog.

$f(g(x))$

$f(x-1)=\frac{4}{x-1+2}=\frac{4}{x+1}, x\neq -1$

Jan 17-12:23 PM

HOMEWORK

...function combinations | due Wednesday | 1.1-1.4 Quiz tomorrow

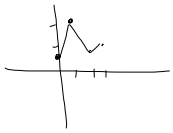
1.5 (p 58): 1, 9, 11, 35-39 odd, 53, 55-56 (skip c)

Aug 1-10:32 AM

What questions do you have from 1.5?
D or F on Quiz? Come to RAO Wed and Thurs.

Aug 1-10:13 AM

(1)



Aug 30-8:59 AM

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

relative min/max
inc/dec/constant
f(x)>0

Aug 30-9:06 AM

Decomposing Functions

Can we do the opposite of composing?

Say $h(x) = (3x^2 - 4x + 1)^5$. If we want $(f \circ g)(x) = h(x)$, what should f and g be?

Example

Express $h(x) = \sqrt{x^2 + 5}$ as a composition of two functions.

Jun 14-1:26 PM

Example

Express $h(x) = \sqrt{1 + \sqrt{1 + x}}$ as a composition of two functions.

Jan 17-12:35 PM

HOMEWORK

...Can you figure out the "inside" and "outside" functions? You'll use function compositions nearly every day in Calculus.

Calculus Preview
Relations in Family Tree(may omit #7, 8 on back)

ENJOY YOUR LOOOOOONG WEEKEND!

Aug 1-10:32 AM