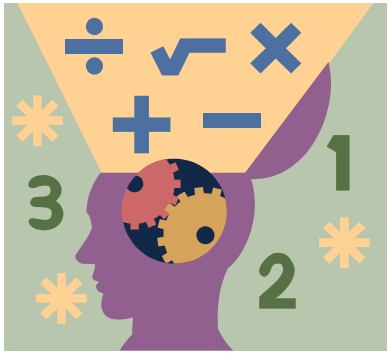
# Business Calculus
# Drill on Derivatives!!!!!!!!!!

# Derivative Drill & Practice

- I’m going to ask you to remember some derivatives.
- It’s important to be fast as time is money.
- When you think you know the answer,

- (or if you give up  ) click to get to the next slide to see if you were correct.

# What's the definition of f '(c)?



# There's 2 of them!

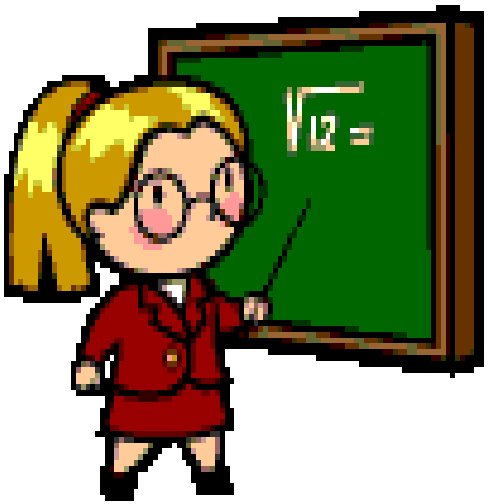
You really need to know both of these thoroughly!

$$\lim(h \to 0) \frac{f(c+h) - f(c)}{h}$$

$$\lim(x \to c) \frac{f(x) - f(c)}{x - c}$$

# What's the definition of f '(x)?

This is a bit different…instead of the limit being a number…it will be a function related to f(x)




☺

# Got it??

$$\lim(h \to 0) \frac{f(x+h) - f(x)}{h}$$

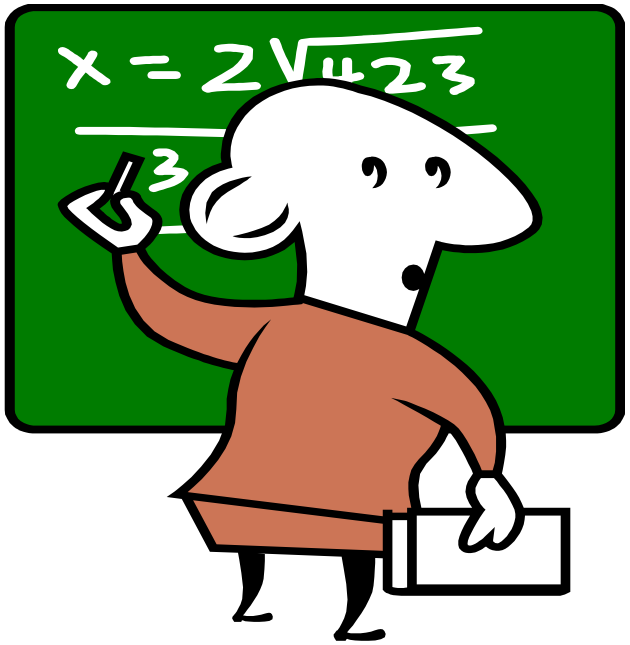
$$\lim(x \to t) \frac{f(x) - f(t)}{x - t}$$

Notice that in the second definition, the arrow points to the independent variable in the final answer.

# What does the derivative, f ‘(x) tell you about f(x)?

(There are many answers…

how many do you know?)



# Here's a few:

Slope of the curve

Instantaneous rate of change in f(x)

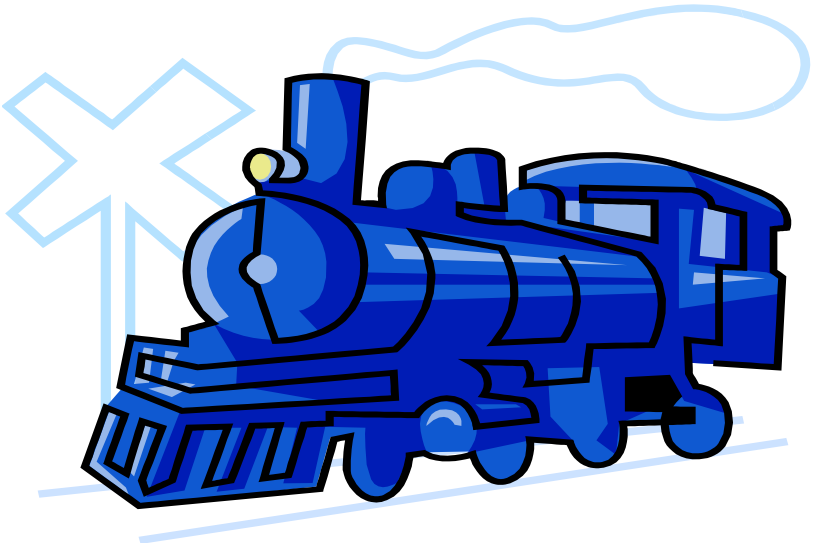
Rate of change

If f(x) is position…then velocity

If f(x) is velocity…then acceleration

# Now…

Here come a series of questions concerning basic derivatives you should know very quickly!



# Ready?

# $d/dx(mx^n)$

- What's your answer?

# $mnx^{n-1}$

- Were you right?

(click for next question)

# $d/dx(e^{f(x)})$

- What is your answer?

# $f'(x)\, e^{f(x)}$

- Were you right?

(click for next question)

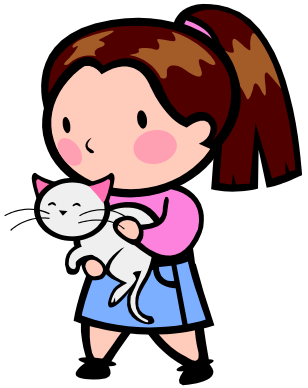
# d/dx(ln|x|)

- What is your answer?

# 1/x

- Were you right?

(click for next question)



# $d/dx(a^x)$

- What's your answer…eh?

# $(\ln a)\, a^x$

- Were you right?

(click for next question)

I dig this calculus stuff!!

# d/dx(ln f(x))

- Ready?

# f ‘ (x) / f(x)

- Were you right?

(click for next question)

# $d/dx\ (a^{f(x)})$

- Go go go go!!!!!

# $(\ln a)\, f'(x)\, a^{f(x)}$

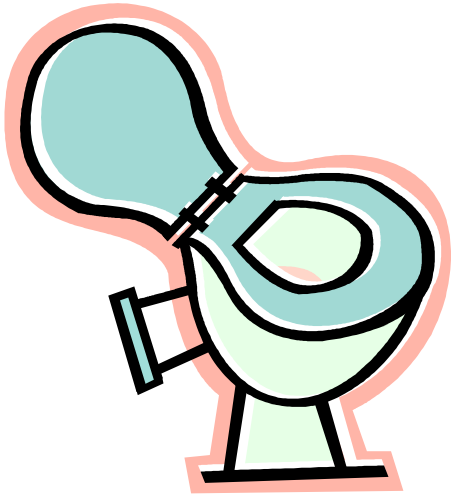
- Were you right?

(click for next question)

Hit that ball!!

# d/dx(f(x)g(x))

- It’s the Product Rule!
- (don’t flush it!!!)



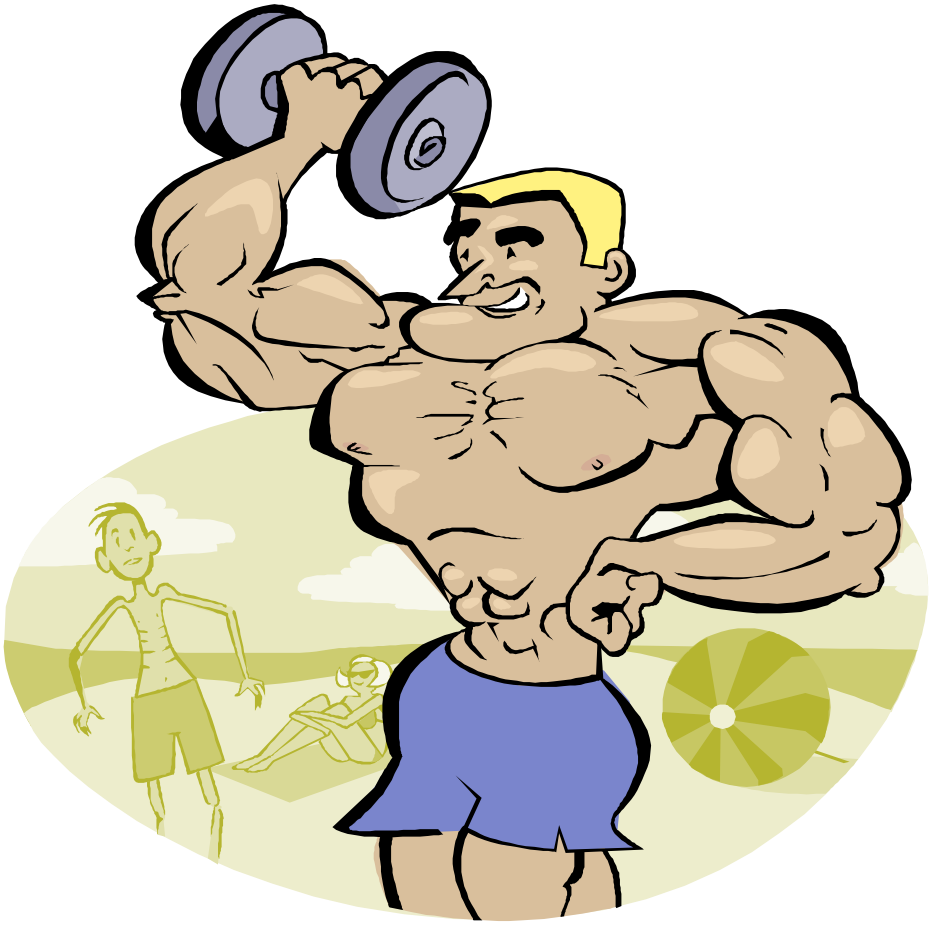
# f ’(x)g(x) + f(x)g‘(x)

Yeah…I know you know it…but I’m afraid…

Promise me you will remember to use the product rule every time you take the derivative of a product!  OK??

# d/dx(f(x)/g(x))

- It’s the merry mighty Quotient Rule!!



Pleeeezzze!
Don’t get the numerator backwards.

$$\frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$$

# d/dx(f(g(x)))

Chain chain chain…. ♫

Chain of fooooools! ♪ ♫ ♫

# Yeah yeah…you're good now…

But what about that Chain Rule?

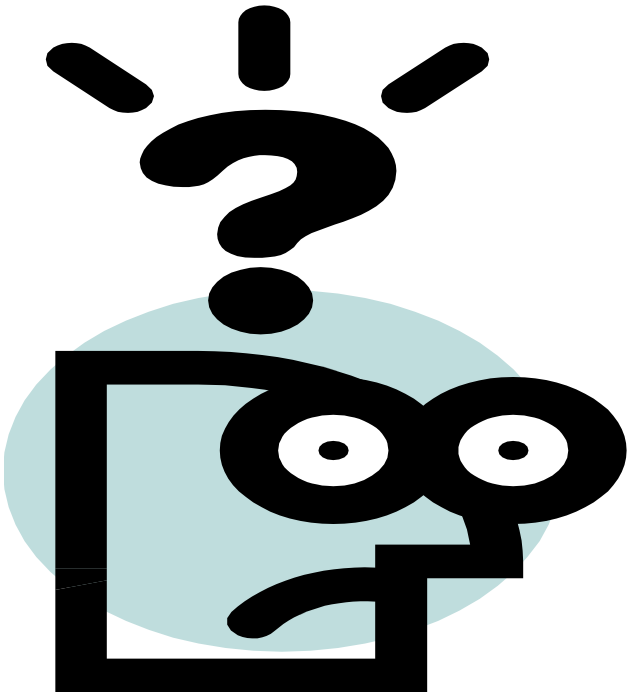
$$f'(g(x)) \bullet g'(x)$$

Don't forget all three steps!

1) Derivative of outside
2) Copy inside
3) Multiply by the "derivative of inside"

# d/dx(y)

Are you confused yet?



# dy/dx

- Did I trick you ?

# Ha ha…I did trick you!

Variable to a variable power - you can't do it…unless you take the natural log first…

$$y = x^x$$

$$\ln y = x \ln x$$

$$(1/y)(dy/dx)=x(1/x)+ 1\ln x$$

$$dy/dx = y(1+\ln x)$$

# OK…switching to Related Rates

For the rest of the questions, pretend you are doing a related rates problem.

That is…”t” is the independent variable…

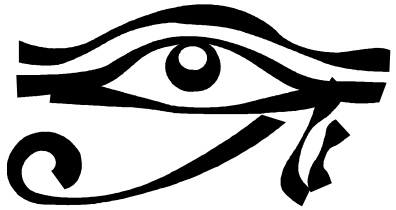
For each expression, give the derivative as you would in a Related Rates problem.

Here we go!!!

y

# dy/dt

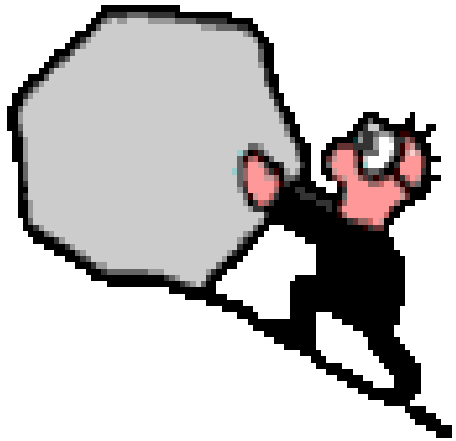
Ready to proceed?



Dr. K is

PROUD of ya!

# Goodbye!



Be sure to run the power points again and again until you are confident with Derivatives.