AP Calculus AB
Wednesday, November 28, 2012

Bellwork...on the board
Go over review from yesterday

Test Friday

Please get your graphing calculator! I am going to show you how to use it to evaluate derivatives, and you need it for the bellwork.

Bellwork... complete letter a and letter c only.

A water tank at Camp Newton holds 1200 gallons of water at time $t = 0$. During the time interval $0 \le t \le 18$ hours, water is pumped into the tank at the rate

Rate → $W(t) = 95\sqrt{t}\sin^2\left(\frac{t}{6}\right)$ gallons per hour.

During the same time interval, water is removed from the tank at the rate

Rate → $R(t) = 275\sin^2\left(\frac{t}{3}\right)$ gallons per hour.

(a) Is the amount of water in the tank increasing at time $t = 15$? Why or why not?

(b) To the nearest whole number, how many gallons of water are in the tank at time $t = 18$?

(c) At what time t, for $0 \le t \le 18$, is the amount of water in the tank at an absolute minimum? Show the work that leads to your conclusion.

(d) For $t > 18$, no water is pumped into the tank, but water continues to be removed at the rate $R(t)$ until the tank becomes empty. Let k be the time at which the tank becomes empty. Write, but do not solve, an equation involving an integral expression that can be used to find the value of k.

$W(x) = 95\sqrt{(x)}(\sin(x \div 6))^2$

$R(x) = 275(\sin(x \div 3))^2$

Radians

(a) $W(15) - R(15) = -121.090$ gallons per hour

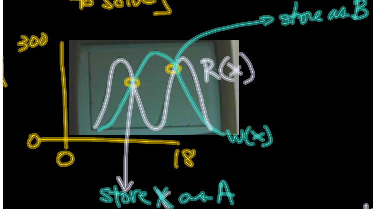
Don't ~~write this~~ on test:
on calc:
VARS → Y-VARS → Y1
$Y1(15) - Y2(15)$

The amount of water in the tank is decreasing @ 15 hrs.

(c) Absolute minimum
→ endpoints of interval
→ any critical values

$W(t) = R(t)$

[use calculator to solve]



X	Amount of Water (we don't know how to find this yet.)
0	1200 gallons
6.49484	<1200
12.97482	
18	

Derivative → number
→ function/symbolic

Calculators find numerical deriv

Ex. If $f(x) = x^2$
what is $f'(-\frac{1}{2})$?

by hand:
$f'(x) = 2x$
$f'(-\frac{1}{2}) = -1$

calc:
Math #8
nDeriv → enter

$\frac{d}{d\boxed{x}}\left(\boxed{x^2}\right)\Big|_{\boxed{x}=\boxed{-\frac{1}{2}}}$

OR

$nDeriv(x^2, x, -\frac{1}{2}) =$

$Y_1 = x^2$

$Y_2 = \frac{d}{dx}(x^2)\Big|_{x=x}$