AP Calculus AB
Wednesday, April 17, 2013

HEADBANZ

Present two more problems
Derivatives/Integrals of natural log, e, and inverse trig functions

Go over diagnostic

9. Find all points of extrema on the interval $[0, 2\pi]$ if $y = x + \sin x$.

$y = x + \sin x$

$y' = 1 + \cos x$

$0 = 1 + \cos x$

$\cos x = -1$

$x = \pi$

x	y
0	0
π	π
2π	2π

(0,0) is a minimum
& $(2\pi, 2\pi)$ is a maximum on $[0, 2\pi]$.

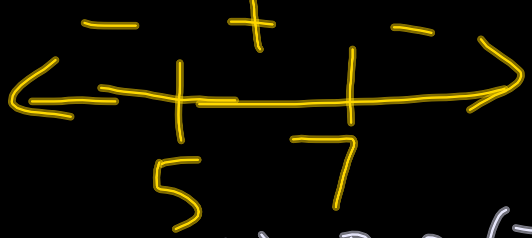
10. Which of the following statements is true of $f(x) = -x^3 + 18x^2 - 105x + 198$?

$$f'(x) = -3x^2 + 36x - 105$$

$$-3(x^2 - 12x + 35)$$

$$f'(x) = -3(x-7)(x-5) = 0$$

$$x = \cancel{0}, 7, 5$$



Since $f'(x) < 0$ on $(-\infty, 5) \cup (7, \infty)$, $f(x)$ is decreasing on those intervals.

Since $f'(x) > 0$ on $(5,7)$, $f(x)$ is increasing on $(5,7)$.

11. Let f and g be differentiable functions with the following characteristics:

I. $f(3) = 2$
II. $f'(3) = -1$
III. $g(3) = 1$
IV. $g'(3) = 4$

If $h(x) = f(x)g(x)$, then $h'(3) =$

$$h'(x) = f(x) \cdot g'(x) + g(x) \cdot f'(x)$$

$$h'(3) = 2 \cdot 4 + 1 \cdot -1$$

$$= 7$$

$$y = e^x$$

$$\log_e y = x$$

$$\ln y = x$$

$$\frac{y'}{y} = 1$$

$$y' = y$$

$$y' = e^x$$

proof of deriv of e^x

$$y = 2^x$$

$$\log_2 y = x$$

change of base thm $\rightarrow \log_b a = \frac{\log a}{\log b}$

$$\frac{\ln y}{\ln 2} = x$$

$$\ln y = x \ln 2$$

$$\frac{y'}{y} = \ln 2$$

$$y' = y \cdot \ln 2$$

$$\boxed{y' = 2^x \cdot \ln 2}$$

$$y = e^x$$

$$y' = e^x \cdot \underbrace{\ln e}_{1}$$