2.4 day 2

Thursday, August 24, 2017 12:32 PM

pg. 94 #29, 33, 40, 41-46 AP Prep pg. 96 #1-4

29. A of circle $= \pi r^2$

instantaneous ROC @ $r=3$ $= \lim_{h\to 0} \frac{\pi(3+h)^2 - \pi \cdot 3^2}{h}$

$= \lim_{h\to 0} \frac{\pi(9+6h+h^2) - 9\pi}{h}$

$= \lim_{h\to 0} \frac{\pi h^2 + 6\pi h}{h}$

$= \lim_{h\to 0} \pi h + 6\pi$

$= 6\pi \ \frac{in^2}{in}$

33. $f(x) = x^2 + 4x - 1$ horizontal tangent $\Rightarrow$ slope $= 0$

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

$= \lim_{h\to 0} \frac{(x+h)^2 + 4(x+h) - 1 - [x^2+4x-1]}{h} = 0$

$= \lim_{h\to 0} \frac{x^2 + 2hx + h^2 + 4x + 4h - 1 - x^2 - 4x + 1}{h} = 0$

$= \lim_{h\to 0} \frac{2hx + 4h + h^2}{h} = 0$

$= \lim_{h\to 0} 2x + 4 + h = 0$

$2x + 4 = 0$

$2x = -4$

$x = -2$ (now plug in to $f(x)$)

The tangent is horizontal at $f(-2) = -5$

40. Average ROC $\Rightarrow$ simple slope
NO difference quotient

A. 3.4 BLN \$/yr

B. 30 BLN \$/yr

C. -36.5 BLN \$/yr

D. It's all over the place and significantly!

41. TRUE
42. FALSE — Have to consider left + right slopes and they don't equal
43. D
44. E
45. C
46. A

$\longrightarrow \lim_{h\to 0} \frac{f(1+h)-f(1)}{h} = \lim_{h\to 0} \frac{\frac{2}{1+h} - 2}{h}$

normal is $\perp$ to target
$y-2 = \frac{1}{2}(x-1)$

$= \lim_{h\to 0} \frac{2 - 2 - 2h}{h(1+h)}$

$= \lim_{h\to 0} \frac{-2h}{h(1+h)}$

$= \lim_{h\to 0} \frac{-2}{1+h}$

$= -2$ ← slope of tangent and through $f(1) = 2$

$y - 2 = -2(x-1)$

AP Prep

1. D
2. E
3. B

$\longrightarrow f(0) = 1$, $f(3) = 2$ Avg. ROC $= \frac{2-1}{3-0} = \frac{1}{3}$

$\lim_{h\to 0} \frac{f(2+h) - f(2)}{h}$

$= \lim_{h\to 0} \frac{9 - (2+h)^2 - (9-4)}{h}$

$$= \lim_{h\to 0} \frac{9-4-4h+h^2-5}{h}$$

$$= \lim_{h\to 0} \frac{h^2-4h}{h}$$

$$= \lim_{h\to 0} \frac{h(h-4)}{h}$$

$= -4$ slope of target and through $(2,5)$

$y-5=-4(x-2)$

4. $f(x)=2x-x^2$

a. $f(3)=-3$

b. $f(3+h)=2(3+h)-(3+h)^2$

$= 6+2h-(9+6h+h^2)$

$= 6+2h-9-6h-h^2$

$= -h^2-4h-3$

c. $\frac{f(3+h)-f(3)}{h} = \frac{-h^2-4h-3+3}{h}$

$= \frac{-h^2-4h}{h}$

$= -h-4$

d. $\lim_{h\to 0} -h-4 = -4$