3.2

Friday, September 1, 2017 7:41 PM

pg. 116 #1-9 odd, 11-14, 27, 28, 40, 41, 42, 44, 45 calc

1. The right hand derivative is 1 because $y = x$ is a LINE.

The left hand derivative follows below

$$f'_{\text{left}}(x) = \lim_{h\to 0} \frac{(x+h)^2 - x^2}{h}$$

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

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

$$= 2x$$

So $f'(0) = 2\cdot 0 = 0$

Since $f'_{\text{left}}(0) \neq f'_{\text{right}}(0)$, $f'(0)$ does not exist.

3. The right hand derivative is 2 because $y = 2x-1$ is a LINE

The left hand derivative follows below:

$$f'_{\text{left}}(x) = \lim_{h\to 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$$

$$= \lim_{h\to 0} \frac{\left(\sqrt{x+h} - \sqrt{x}\right)\left(\sqrt{x+h} + \sqrt{x}\right)}{h\left(\sqrt{x+h} + \sqrt{x}\right)}$$

$$= \lim_{h\to 0} \frac{x+h-x}{h\left(\sqrt{x+h} + \sqrt{x}\right)}$$

$$= \lim_{h\to 0} \frac{h}{h\left(\sqrt{x+h} + \sqrt{x}\right)}$$

$$= \lim_{h\to 0} \frac{1}{\sqrt{x+h} + \sqrt{x}}$$

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

So at $f'(1) = \frac{1}{2\sqrt{1}} = \frac{1}{2}$

Since $f'_{\text{left}}(1) \neq f'_{\text{right}}(1)$, $f'(1)$ does not exist.

5. A. $[-3, 2]$ Differentiable $\Rightarrow$ continuous

B. None There is a slope @ every point because it is a LINE

C. None

6. A. $[-2, 3]$

B. None

C. None

7. A. $[-3, 0) \cup (0, 3]$

B. None

C. $x = 0$

8. A. $[-2, -1) \cup (-1, 0) \cup (0, 2) \cup (2, 3]$

All points in interval except $x = -1, 0, 2$

B. $x = -1$

C. $x = 0, 2$

9. A. $[-1, 0) \cup (0, 2]$

All points in interval except $x = 0$

B. $x = 0$

C. None

10. A. $[-3, -2) \cup (-2, 2) \cup (2, 3]$

All points in interval except $x = -2, 2$

B. $x = -2, 2$

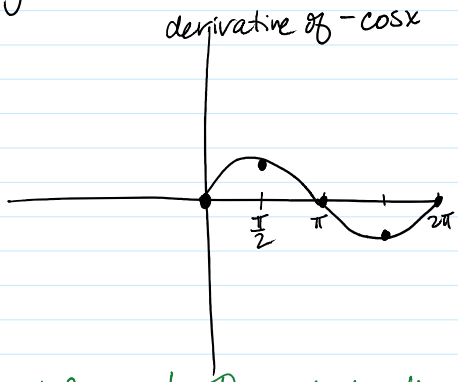
C. None

11. discontinuity $\lim_{x \to 0} \neq y(0)$
12. cusp
13. corner
14. vertical tangent

27. $y = -\cos x$

derivative of $-\cos x$

27. $y = -\cos x$



nDerive $\frac{d}{dx}(-\cos x)\Big|_{x=0}$

then $\frac{\pi}{2}$

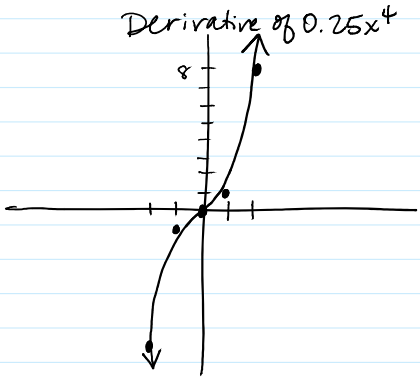
then π

then $\frac{3\pi}{2}$

then 2π

Wowza! The derivative of $-\cos x$ is $\sin x$!

28. $y = 0.25x^4$



nDeriv $\frac{d}{dx}(0.25x^4)\Big|_{x=0}$

then 1

then -1

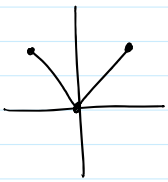
then 2

then -2

Wowza! The derivative looks like x^3!

40. T Differentiable $\Rightarrow$ continuous

41. F



continuous $\not\Rightarrow$ differentiable

42. B

$$f(x) = \begin{cases} 2x+1, & x \le 0 \\ x^2+1, & x > 0 \end{cases}$$

44. B

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

$n \to \upsilon$

C