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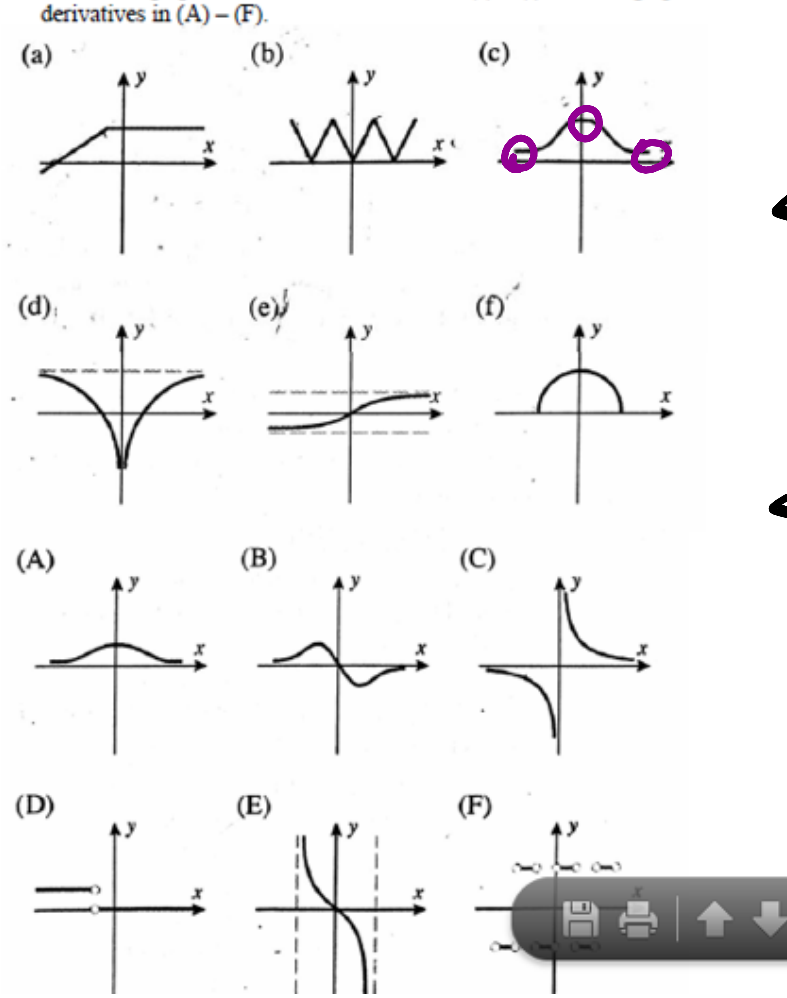
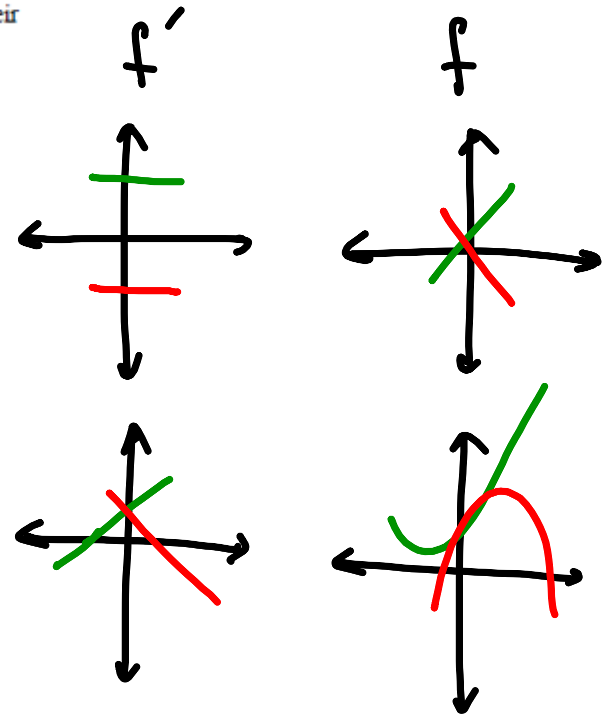
27. Match the graphs of the functions shown in (a) – (f) with the graphs of their derivatives in (A) – (F).





d → C

e → A

a → D

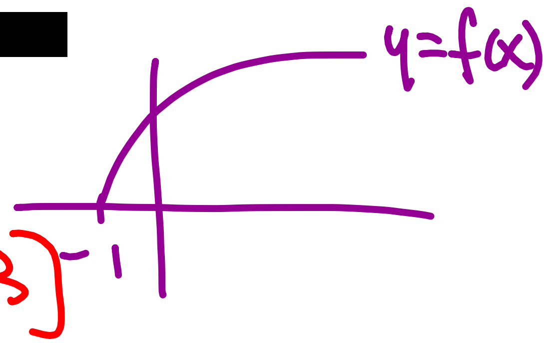
b → F

c → B

f → E

37. Verify that the hypotheses of the Mean Value Theorem are satisfied on the given interval and find all values of c in that interval that satisfy the conclusion of the theorem for $f(x)=\sqrt{x+1}$ on the interval [0, 3].

[redacted]



Since the function is cnt. & diff. over [0,3]

We can use MVT.

$$\frac{f(b)-f(a)}{b-a}=f'(c),\ a<c<b$$

$$\frac{f(3)-f(0)}{3-0}=\frac{2-1}{3}=\frac{1}{2\sqrt{c+1}}$$

$$\frac{1}{3}=\frac{1}{2\sqrt{c+1}}$$

$$3=2\sqrt{c+1}$$

$$\frac{3}{2}=\sqrt{c+1}$$

$$\frac{9}{4}=c+1$$

$$\frac{5}{4}=c$$

38. Given $y = \sqrt{\ln x}$, find $y'(e^5)$.

39. Given $y = e^{7x}$, find $y'(\ln 5)$.

40. Given $y = \pi^{\sin x}$, find $y'(\pi)$.

$* \ln e^5 = 5 \ln e$

38) $y = (\ln x)^{\frac{1}{2}}$

$y' = \frac{1}{2}(\ln x)^{-\frac{1}{2}} \cdot \frac{1}{x}$

$= \left.\frac{1}{2x\sqrt{\ln x}}\right|_{x=e^5} = \frac{1}{2e^5\sqrt{\ln e^5}}$

$= \frac{1}{2e^5\sqrt{5}}$

39) $y = e^{7x}$

$y' = 7e^{7x}\Big|_{\ln 5} = 7e^{7(\ln 5)}$

$\ln e^{k} = k$ $\qquad = 7e^{\ln 5^{7}}$

$e^{\ln k} = k$ $\qquad = 7 \cdot 5^{7}$

40) $y = \pi^{\sin x}$

$$y' = \pi^{\sin x} \cdot \ln \pi \cdot \cos x \Big|_{x=\pi}$$

$$= \pi^{\sin \pi} \ln \pi \cdot \cos \pi$$

$$= 1 \cdot \ln \pi \cdot (-1) = -\ln \pi$$

$$= \ln \pi^{-1} = \ln\left(\frac{1}{\pi}\right)$$

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28. Given the following table of values, find the indicated derivatives:

x	$f(x)$	$f'(x)$
2	1	7
8	5	-3

(a) $g'(2)$ where $g(x) = [f(x)]^3$

(b) $h'(2)$ where $h(x) = f(x^3)$

a) $g'(x) = 3[f(x)]^2 f'(x)$

$\underset{x=2}{=} 3(f(2))^2 \cdot f'(2)$

$= 3(1)^2 \cdot 7 = 21$

b) $h'(x) = f'(x^3) \cdot 3x^2$

$\underset{x=2}{=} f'(8) \cdot 3(2)^2$

$= (-3)12 = -36$

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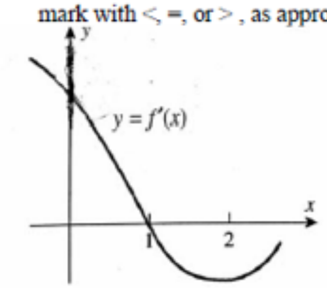
33. Use the graph of $y = f'(x)$ in the accompanying figure to replace the question mark with <, =, or >, as appropriate. Explain your reasoning.



(a) $f(0) ? f(1)$ $<$

(b) $f(1) ? f(2)$ $>$

(c) $f'(0) ? 0$ $>$

(d) $f'(1) ? 0$ $=$

(e) $f''(0) ? 0$ $<$

(f) $f''(2) ? 0$ $=$

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41. Find the absolute maximum and minimum values of *f* on the given closed interval and state where those values occur for $f(x) = \sin x - \cos x$ on the interval $[0, \pi]$.

$$f' = \cos x + \sin x = 0$$

$$\sin x = -\cos x$$

$$\tan x = \frac{\sin x}{\cos x} = -1$$

x	y
0	−1
$\frac{3\pi}{4}$	$\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} = \sqrt{2}$
π	+1