★ use calc

Derivatives & Graphs - ANSWERS

(1) Notice this is a graph of f' and question wants to know
(B) about f so look at f' for positive/negative y-values.
From $(-2,0)$ f' is $+$ so f is increasing. From $(0,2)$ f' is $-$ so
f is dec. BTW, local max @ $x=0$.

(2) Given f' so set this equal to 0. Find critical #'s then use 1st
(D) derivative test to check intervals.

$$0=x^2-\frac{2}{x} \Rightarrow 0=x^3-2 \Rightarrow 2=x^3 \Rightarrow x=\sqrt[3]{2}$$

. No calculator allowed on this question so use brain to figure what $\sqrt[3]{2}$ is.
$\sqrt[3]{1}=1$ and $\sqrt[3]{8}=2$ so $\sqrt[3]{2}$ is 1. some # less than 5. $\sqrt[3]{2}<1.5$
Another # to consider is $x=0$ because of $f'=x^2-\frac{2}{x}$ ← $x\neq 0$

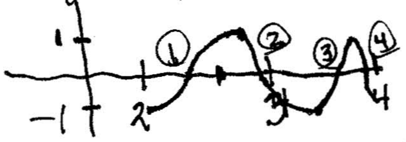
Intervals are $(-\infty,0)$, $(0,\sqrt[3]{2})$, $(\sqrt[3]{2},\infty)$
$x=-1$, $x=1$, $x=3$
f' $+$, f' $-$, $+$ f'
f inc, f dec, inc f

(3) Need to go to 2ND der. Use product rule
(A) $f'(x)=2x\cdot e^x+e^x(2)=2xe^x+2e^x$
$f''(x)=2x\cdot e^x+e^x(2)+2e^x=2xe^x+2e^x+2e^x=2xe^x+4e^x=2e^x(x+2)$
$2e^x=0$ has no solution $\quad x+2=0 \Rightarrow x=-2$
Now check intervals to find concavity. $(-\infty,-2)$, $(-2,\infty)$
$x=-3$, $x=0$
f'' $-$, $+$
f con ↓, con ↑

(4) Know g is cont. and $g'(-2)=0$ and $g'(2)=0$
(A) g will be decreasing where g' is neg. Don't pick $[-1,1]$ because g' is neg right after -2 and right before 2.

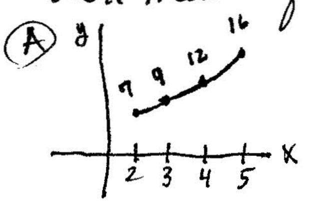
(5) Find f' then set f' = to 0. then find intervals where f' is $+$
(C) $f'(x)=4x^3+2x \quad 0=2x(2x^2+1)$ $\quad x=0$, $\quad (-\infty,0)$, $(0,\infty)$
$2x=0$, $x=0$ $\quad 2x^2=-1$, $x^2=-\frac{1}{2}$ No sol. $\quad x=-1$, $x=1$
f' $-$, $+$
f dec, inc

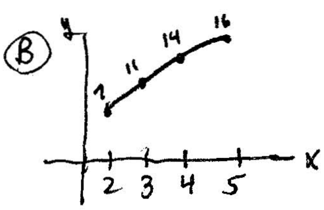
★ (6) put $\sin(x^2+1)$ into graph part of calc. Count how many times f' intersects
(D) x-axis.



f' graphed

(7) positive 1st der means f will increase (this eliminates C, D & E)
(B) negative 2ND der. means f is con↓. Let's analyze A & B.





must be B because to connect dots, got to go con. ↓.