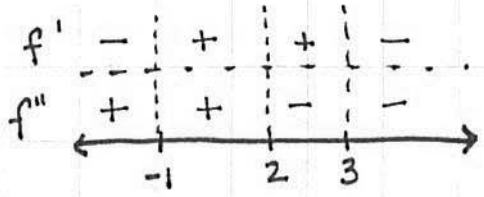
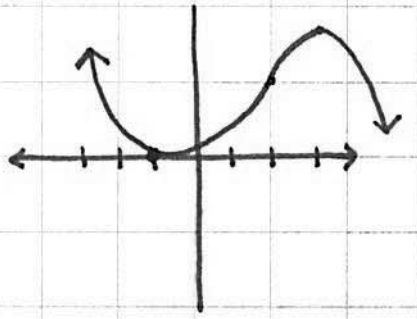
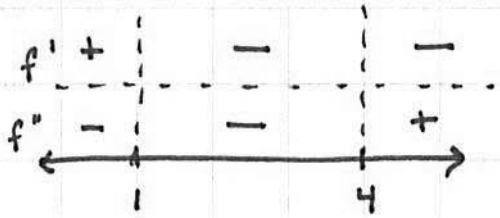
Key - Using Sign Charts

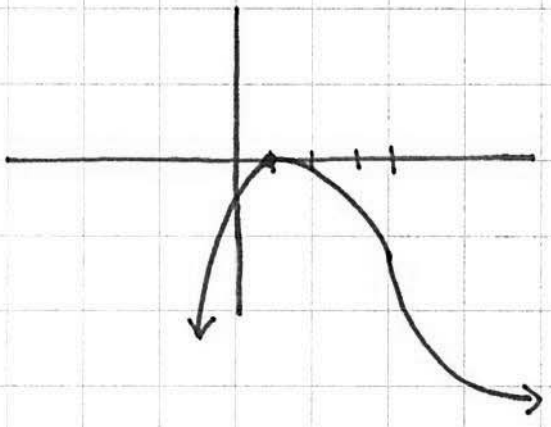
1. A.



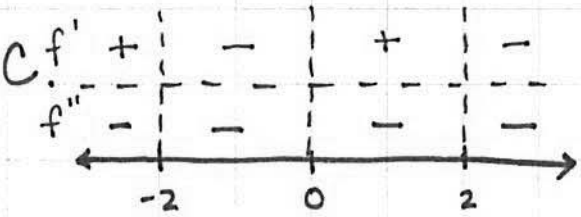


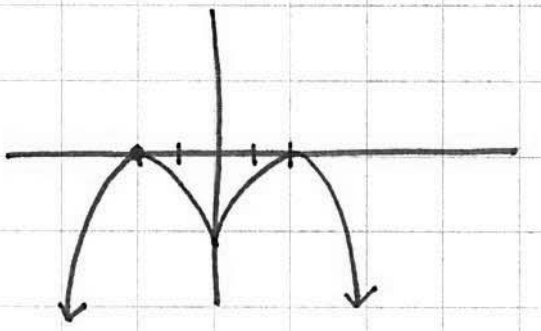
B.





C.



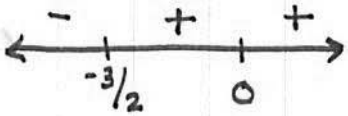


2. A. $f(x) = x^4 + 2x^3 - 1$

$f' = 4x^3 + 6x^2$

$0 = 2x^2(2x+3)$

CN = $0, -3/2$

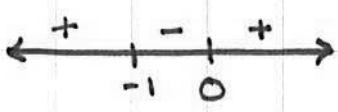


Rel min @ $x = -3/2$

$f'' = 12x^2 + 12x$

$0 = 12x(x+1)$

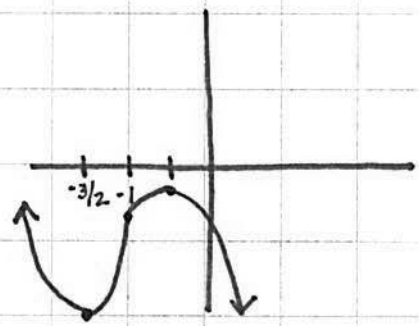
PPoI @ $0, -1$



PoI @ $x = -1, 0$

concave up $(-\infty, -1) \cup (0, \infty)$

concave $\downarrow$ $(-1, 0)$

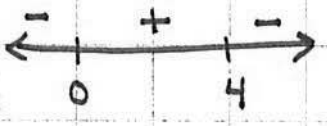


x	f(x)
$-3/2$	$\frac{+81}{16} + 2\left(\frac{-27}{8}\right) - 1 = \frac{-43}{16}$
-1	$1 - 2 - 1 = -2$
0	-1

B. $f(x) = \frac{8x-16}{x^2} = \frac{8}{x} - \frac{16}{x^2} = 8x^{-1} - 16x^{-2}$

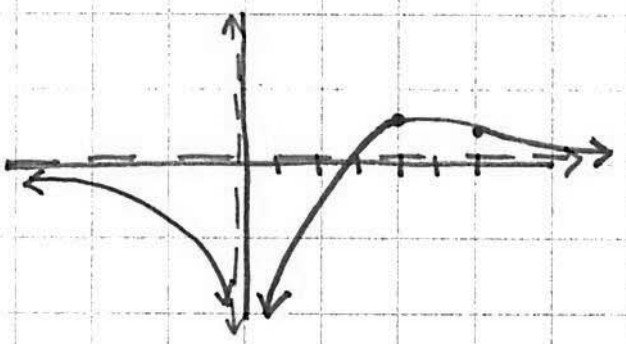
$f' = \frac{-8}{x^2} + \frac{32}{x^3} = \frac{-8x+32}{x^3} = 0$

CN @ $x = 4, 0$



~~Rel min @ x=0~~ (DNE)

Rel max @ $x=4$



x	f(x)
4	1
6	$\frac{32}{36} = \frac{8}{9}$

$f'' = \frac{16}{x^3} - \frac{96}{x^4} = \frac{16x-96}{x^4} = 0$

PPOI @ $x = 6, 0$

concave ↑ $(6, \infty)$

concave ↓ $(-\infty, 6)$

POI @ $x = 6$

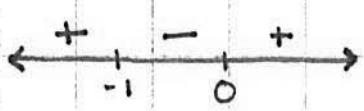
C. $f(x) = 2x + 3x^{2/3}$

$f' = 2 + 2x^{-1/3} = 2 + 3\frac{2}{\sqrt[3]{x}}$

$f' = \frac{2\sqrt[3]{x} + 2}{\sqrt[3]{x}} = 0$

$\sqrt[3]{x} = 0$

CN @ $x = -1, 0$

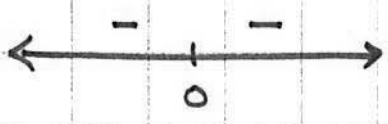


Rel Max @ $x = -1$

Rel min @ $x = 0$

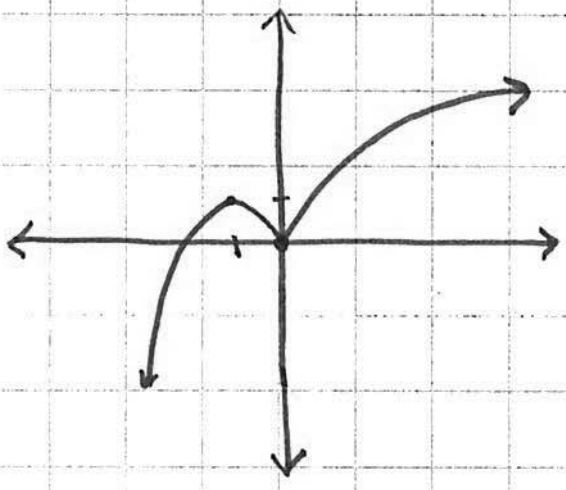
$f'' = -\frac{2}{3}x^{-4/3}$

PPoI @ $x = 0$



no PoI

always concave ↓



x	f(x)
-1	-2 + 3 = 1
0	0