Level 2/3 - Summary of 4.1 and 4.2

Graph $f(x) = -2x^4 - 8x^3$

Find the critical numbers by setting f'(x) = 0 and solving for x.

$f'(x) = -8x^3 - 24x^2$

$0 = -8x^2(x + 3)$

$x = 0 \text{ or } -3$ There is either a max, min or "cubic looking feature" at these two x values.

Determine the critical points by plugging x value into f(x) to get the coordinates.

$f(0) = -2(0) - 8(0)$ (0,0)

$f(-3) = -2(81) - 8(-27)$

$= -162 + 216$

$= 54$ (-3, 54)

Determine if the points represent minimum, maximum, or neither by checking if graph is increasing or decreasing before and after the critical point.

$f'(-1) < 0$

$f'(1) < 0$ decreasing, then flat, then decreasing so it looks like a cubic at (0,0)

$f'(-4) > 0$

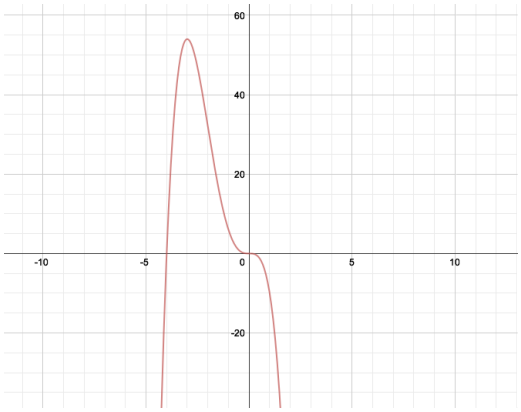
$f'(-2) < 0$ increasing, then flat then decreasing so a max at (-3,54)

Check end behaviours:

$f(1000) =$ big negative number

$f(-1000) =$ big negative number

Sketch.


60
40
20
-20
-10
-5
0
5
10