L5 – Curve Sketching

Unit 2

MCV4U

Jensen

1) For each function, determine the coordinates of the local extrema. Classify each point as a local max or min.

a) $y = 2x - 3x^2$

b) $y = 2t^3 + 6t^2 + 6t + 4$

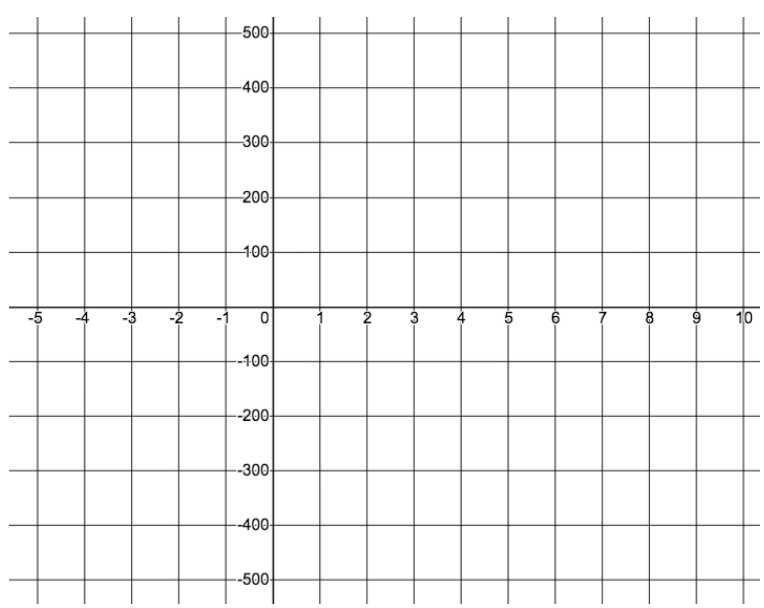
2) For each function, determine the coordinates of any points of inflection.

a) $f(x) = 2x^3 - 4x^2$

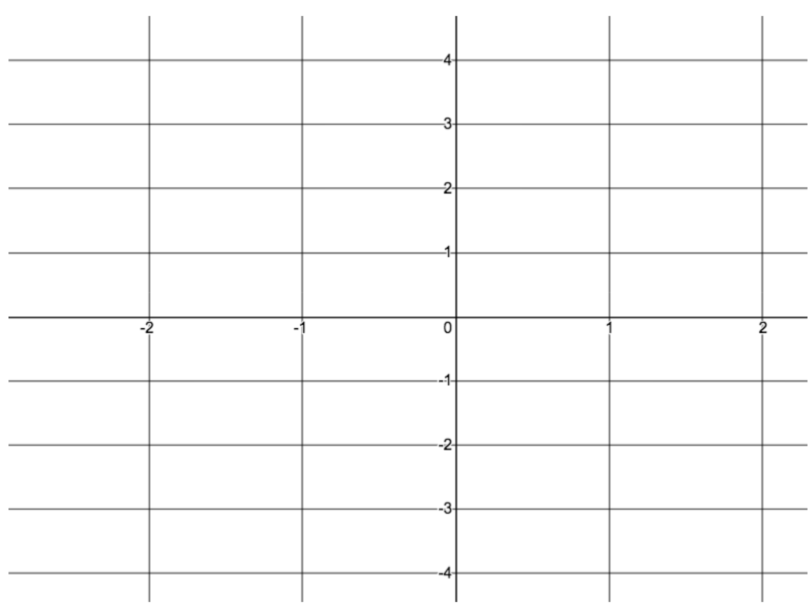
b) $f(x) = 3x^5 - 5x^4 - 40x^3 + 120x^2$

3) Use the algorithm for curve sketching to analyze the key features of each of the following functions and to sketch a graph of them.

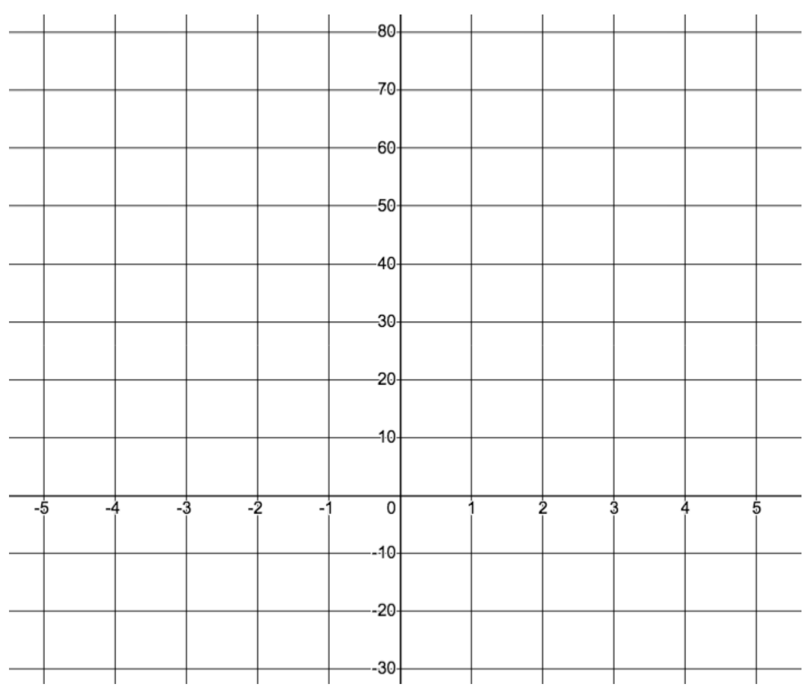
a) $f(x) = x^4 - 8x^3$



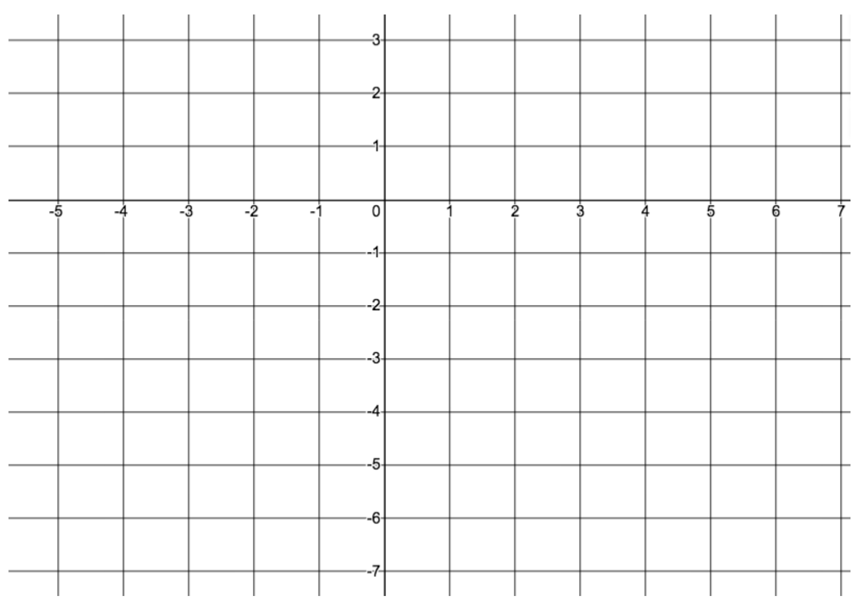
b) $g(x) = 3x^3 + 7x^2 + 3x - 1$



c) $h(x) = 2x^4 - 26x^2 + 72$



d) $j(x) = \frac{x^2+2x-4}{x^2}$

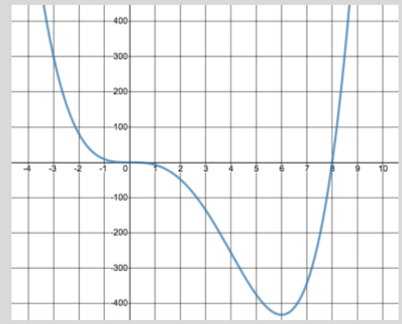


Answers:

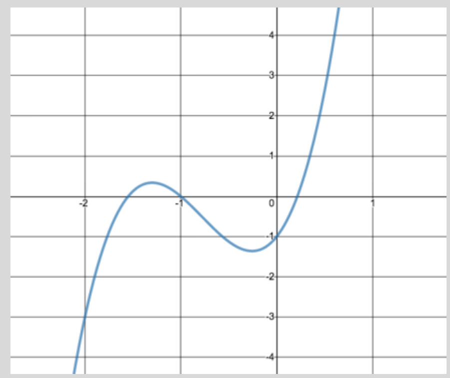
1)a) max: $\left(\frac{1}{3}, \frac{1}{3}\right)$ **b)** no local extrema; $(-1,2)$ is an inflection point NOT a max or min

2)a) $\left(\frac{2}{3}, -\frac{32}{27}\right)$ **b)** $(-2, 624)$, $(2,176)$, and $(1,78)$

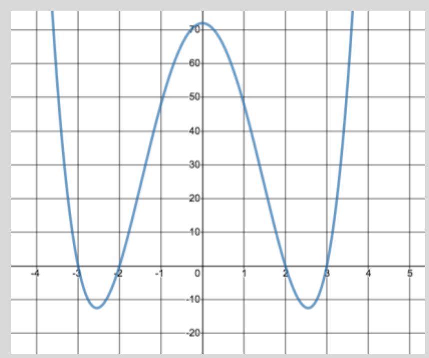
3)a) x-int: $(0,0)$ and $(8,0)$; y-int: $(0,0)$; local max: none; local min: $(6, -432)$; POI: $(0,0)$ and $(4, -256)$; increasing: $x > 6$; decreasing: $x < 0$ and $0 < x < 6$; concave up: $x < 0$ and $x > 4$; concave down: $0 < x < 4$



b) x-int: $(-1,0)$, $(0.215,0)$, and $(-1.549,0)$; y-int: $(0, -1)$; local max: $(-1.3, 0.34)$; local min: $(-0.26, -1.36)$; POI: $(-0.78, -0.51)$; increasing: $x < -1.3$ and $x > -0.26$; decreasing: $-1.3 < x < -0.26$; concave up: $x > -0.78$; concave down: $x < -0.78$



c) x-int: $(-3,0)$, $(-2,0)$, $(2,0)$ and $(3,0)$; y-int: $(0,72)$; local max: $(0,72)$; local min: $(-2.55, -12.5)$ and $(2.55, -12.5)$; POI: $(-1.47,25.16)$ and $(1.47,25.16)$; increasing: $-2.55 < x < 0$ and $x > 2.55$; decreasing: $x < -2.55$, and $0 < x < 2.55$; concave up: $x < -1.47$ and $x > 1.47$; concave down: $-1.47 < x < 1.47$



d) VA: $x = 0$; HA: $y = 1$; x-int: $(-3.24,0)$, and $(1.24,0)$; y-int: none; local max: $(4,1.25)$; local min: none; POI: $(6,1.22)$; increasing: $0 < x < 4$ and; decreasing: $x < 0$, and $x > 4$; concave up: $x > 6$; concave down: $x < 0$ and $0 < x < 6$