2.5 Curve Sketching Worksheet

This document was composed and formatted by Annie Bernatchez.

The course material originated from www.jensenmath.ca

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

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

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

Answer Key

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 $(0, 0)$

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: $0 < x < 4$; decreasing: $x < 0$, and $x > 4$; concave up: $x > 6$; concave down: $x < 0$ and $0 < x < 6$

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