Curve Sketching Practice Problems

Math 1210

November 7, 2018

Problem 1

Let
$$f(x) = 2x^3 + 3x^2 - 12x$$
Sketch the graph of f. Clearly label any x and y intercepts, horizontal asymptotes, vertical asymptotes, relative max pairs, relative min pairs, and inflection points.

Problem 2

Suppose f is a function with all of the following properties:

(a) f has domain= $(-\infty, 2) \cup (2, \infty)$.

(b) f has x-intercepts -3, 4, 7, and 9. f has y-intercept 6.

(c) $\lim_{x \to \infty} f(x) = \infty$ and $\lim_{x \to -\infty} f(x) = -5$. Also, f has a vertical asymptote $x = 2$. f has the following behavior near this vertical asymptote:

$$\lim_{x \to 2^+} f(x) = -\infty \qquad \text{and} \qquad \lim_{x \to 2^-} f(x) = \infty$$

(d) f is increasing on $(-\infty, 2)$, $(2, 5)$, and $(8, \infty)$. f is decreasing on $(5, 8)$

(e) f has a relative max pair of $(5, 3)$ and a relative min pair of $(8, -1)$.

(f) f is concave up on $(-\infty, 2)$ and $(6, \infty)$. f is concave down on $(2, 6)$.

(g) f has an inflection point $(6, 1)$.

Sketch a possible graph of f. In other words, sketch the graph of a single function which has all of the properties listed above. Clearly label any x and y intercepts, horizontal asymptotes, vertical asymptotes, relative max pairs, relative min pairs, and inflection points.

Problem 3

Let
$$f(x) = \frac{x^2 - 8x - 9}{x(x + 1)}$$
Sketch the graph of f. Clearly label any x and y intercepts, horizontal asymptotes, vertical asymptotes, relative max pairs, relative min pairs, and inflection points.