

Answers to Companion Notes for MATH 229 Section 12.3.

1. Sketch the graph of $y = f(x) = x^3 - 9x^2 + 24x - 10$.

(a) Determine the Domain of f .

$(-\infty, \infty)$

(b) Find the x and y intercepts.

y -intercept is $(0, -10)$. The x -intercepts are too difficult to find.

(c) Find Asymptotes

Polynomials have no asymptotes.

(d) Determine the intervals where $f(x)$ is increasing or decreasing.

Increasing on the intervals $(-\infty, 2)$ and $(4, \infty)$. Decreasing on the interval $(2, 4)$

(e) Find relative extrema of $f(x)$

The point $(2, 10)$ is a maximum. The point $(4, 6)$ is a minimum

(f) Determine concavity of $f(x)$.

Concave down on $(-\infty, 3)$. Concave up on $(3, \infty)$.

(g) Find inflection points.

The point $(3, 8)$ is an inflection point.

(h) Graph

Try it!

2. Sketch the graph of $y = f(x) = \frac{x+4}{x-2}$.

(a) Determine the Domain of f .

$(-\infty, 2)$ and $(2, \infty)$

(b) Find the x and y intercepts.

y -intercept $(0, -2)$ x -intercept $(-4, 0)$

(c) Find Asymptotes

Vertical Asymptote: $x = 2$ Horizontal Asymptote: $y = 1$

(d) Determine the intervals where $f(x)$ is increasing or decreasing.

Decreasing on $(-\infty, 2)$ and $(2, \infty)$

(e) Find relative extrema of $f(x)$

No relative extrema.

(f) Determine concavity of $f(x)$.

Concave down on $(-\infty, 2)$. Concave up on $(2, \infty)$.

(g) Find inflection points.

No inflection points because $f(x)$ is not defined at $x = 2$.

(h) Graph

Try it!