

Curve Sketching

So far we have seen that

- (i) If $f'(x) > 0$ on an interval then the graph of $y = f(x)$ is increasing on the interval;
- (ii) If $f'(x) < 0$ on an interval then the graph of $y = f(x)$ is decreasing on the interval;
- (iii) If $f''(x) > 0$ on an interval then the graph of $y = f(x)$ is concave up on the interval;
- (iv) If $f''(x) < 0$ on an interval then the graph of $y = f(x)$ is concave down on the interval.

Using this information we then located relative extrema and inflection points, and we sketched a fairly accurate picture of the graph of $y = f(x)$.

We now improve our graph by making use of additional information:

- (i) The x -intercepts of $y = f(x)$,
- (ii) the y -intercept of $y = f(x)$,
- (iii) the horizontal asymptotes of $y = f(x)$, and
- (iv) the vertical asymptotes of $y = f(x)$.

Example 1

Let $f(x) = \frac{\ln(x)}{x}$. Sketch the graph of $y = f(x)$ using the

- (i) x -intercepts
- (ii) y -intercepts
- (iii) vertical asymptotes
- (iv) horizontal asymptotes
- (v) intervals of increase/decrease
- (vi) local extreme values
- (vii) intervals of concavity
- (viii) inflection points