

Name: _____

Solve the following equations for x or state that none exist.

1. $5e^x - 2 = 0$

3. $5\ln(x) - 6 = 0$

2. $5e^x + 4 = 0$

4. $5\ln(x) + 7 = 0$

This page contains information and techniques you will need for Sections 4.5 and 4.6.

1. Write in your own words how to find the critical numbers of a function $f(x)$ and why they are important.

2. Draw a graph of a function $f(x)$ with domain $(-\infty, \infty)$ such that

- (i) $f'(a) = f'(b) = 0$ and $f'(c)$ is undefined,

- and

- (i) f has a local minimum at $x = a$, a local maximum at $x = c$ and neither at $x = b$.

3. Draw a graph of a function $f(x)$ with domain $(-\infty, \infty)$ such that

- (a) $f(x) < 0$ and $f'(x) > 0$.

- (b) $f'(x) < 0$ and $f''(x) > 0$.

4. For each function below, find (a) its domain and (b) all its critical points.

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

(b) $f(x) = x^{1/5}$

(c) $f(x) = \arctan(x)$

(d) $f(x) = \frac{x^2}{x^2-4}$ (Note: $f'(x) = \frac{-8x}{x^2-4}$.)

(e) $f(x) = e^{(1-x)^2}$

(f) $f(x) = \sqrt{x^2 - 4}$

5. For each derivative below, determine the intervals for which that derivative is positive and negative.

(a) $f'(x) = x^{-4/5}$

(b) $y'' = \frac{8(3x^2+4)}{(x^2-4)^3}$

(c) $g'(x) = 3x^2e^{2x} + 2x^3e^{2x}$

6. Write a formula for a function $f(x)$ such that $f(x)$ has asymptotes $x = 1$, $x = 4$ and $y = 0$.

7. Give an example of a graph with two different horizontal asymptotes.

8. Evaluate each limit below.

(a) $\lim_{x \rightarrow 2^+} \frac{5}{x-2}$

(d) $\lim_{x \rightarrow \infty} \frac{5}{x-2}$

(b) $\lim_{x \rightarrow 2^-} \frac{5}{x-2}$

(e) $\lim_{x \rightarrow -\infty} \frac{5}{x-2}$

(f) $\lim_{x \rightarrow \infty} \left(8 + \frac{5}{x-2} \right)$

(c) $\lim_{x \rightarrow 2} \frac{5}{x-2}$

(g) $\lim_{x \rightarrow \infty} \left(x + \frac{5}{x-2} \right)$