Name: _

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

1.
$$5e^{x}-2=0$$
, $e^{x}=\frac{2}{5}$, $x=\ln(\frac{2}{5})$
2. $5e^{x}+4=0$, $e^{x}=\frac{4}{5}$, no solution
4. $5\ln(x)+7=0$, $\ln(x)=\frac{4}{5}$, $x=e^{45}$

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.

(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



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

(a)
$$f(x) = x^{3} - 2x^{2}$$
 $D: (-\infty, \infty)$
 $f'(x) = 3x^{2} - 4x = x (3x - 4) = 0$ $Crit + 4's : x = 0, x = \frac{4's}{3}$
(b) $f(x) = x^{1/5}$ $D: (-\infty, \infty)$
 $f'(x) = \frac{1}{5} - \frac{1}{5} -$

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

(a)
$$f(x) = x^{-4/5}$$
 is undefined at $x=0$
 $+ x + 1 = \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$ Sign of
 $f' = 0$ for all x in the domain
(b) $y'' = \frac{8(3x^2+4)}{(x^2-4)^3}$ y'' is and fined when $x = \pm 2$
 $f = \frac{1}{2} + \frac$

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g'(1) = (+)(7)(+) > 0

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

$$f(x) = \frac{1}{(x-1)(x-4)}$$

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



8. Evaluate each limit below.

(a)
$$\lim_{x \to 2^+} \frac{5}{x-2} = +\infty$$

(b)
$$\lim_{x \to 2^-} \frac{5}{x-2} = -\infty$$

(c) $\lim_{x \to 2} \frac{5}{x-2} = \mathbf{P} \mathbf{N} \mathbf{E}$

(d) $\lim_{x \to \infty} \frac{5}{x-2} = \mathbf{0}$ (e) $\lim_{x \to -\infty} \frac{5}{x-2} = \mathbf{0}$ (f) $\lim_{x \to \infty} \left(8 + \frac{5}{x-2}\right) = \mathbf{8}$ (g) $\lim_{x \to \infty} \left(x + \frac{5}{x-2}\right) = \mathbf{\infty}$

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