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Calculus 1 Assignment-7
Section: 04
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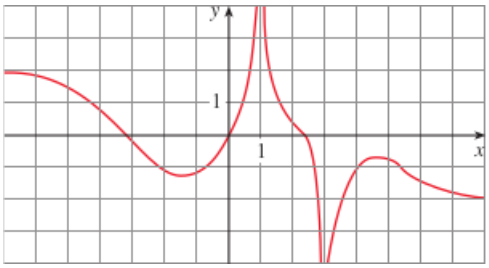
Section 3.4:

3. For the function f whose graph is given, state the following.



(a)

$$\boxed{\lim_{x\to\infty} f(x) = -2}$$

(b)

$$\boxed{\lim_{x\to-\infty} f(x) = 2}$$

(c)

$$\boxed{\lim_{x\to 1} f(x) = \infty}$$

(d)

$$\boxed{\lim_{x\to 3} f(x) = -\infty}$$

(e) The equations of the asymptotes

$$\boxed{x = 1, x = 3, y = -2, y = 2}$$

8. Evaluate the limit and justify each step by indicating the appropriate properties of limits.

$$\lim_{x\to\infty} \sqrt{\frac{9x^3 + 8x - 4}{3 - 5x + x^3}}$$

$$= \lim_{x\to\infty} \sqrt{\frac{x^3(9 + 8/x^2 - 4/x^3)}{x^3(3/x^3 - 5/x^2 + 1)}}$$

$$= \lim_{x\to\infty} \sqrt{\frac{9 + 8/x^2 - 4/x^3}{3/x^3 - 5/x^2 + 1}}$$

$$= \sqrt{\frac{9+0-0}{0-0+1}}$$

$$\boxed{= \sqrt{9} = 3}$$

11. Find the limit or show that it does not exist.

$$\lim_{t\to-\infty} \frac{3t^2+t}{t^3-4t+1}$$

$$= \lim_{t\to-\infty} \frac{t^2(3+1/t)}{t^3(1-4/t^2+1/t^3)}$$

$$= \lim_{t\to-\infty} \frac{(3+1/t)}{t(1-4/t^2+1/t^3)}$$

$$\boxed{= 0}$$

18. Find the limit or show that it does not exist.

$$\lim_{t\to\infty} \frac{t+3}{\sqrt{2t^2-1}}$$

$$= \lim_{t\to\infty} \frac{t(1+3/t)}{t\sqrt{2-1/t^2}}$$

$$= \lim_{t\to\infty} \frac{1+3/t}{\sqrt{2-1/t^2}}$$

$$= \frac{1+0}{\sqrt{2-0}}$$

$$\boxed{= \frac{1}{\sqrt{2}}}$$

26. Find the limit or show that it does not exist.

$$= \lim_{x\to-\infty} (\sqrt{4x^2+3x}+2x)$$

$$= \lim_{x\to-\infty} (|x|\sqrt{4+3/x}+2x)$$

Because x is approaching to $-\infty$. $|x| = -x$.

$$= \lim_{x\to-\infty} (-x\sqrt{4+3/x}+2x)$$

$$= \lim_{x\to-\infty} x(-\sqrt{4+3/x}+2)$$

$$= -\infty(-2+2)$$

$$= -\infty(0)$$

$$\boxed{= 0}$$

28. Find the limit or show that it does not exist.

$$\lim_{x\to\infty}(x-\sqrt{x})$$
$$=\lim_{x\to\infty}x(1-1/\sqrt{x})$$
$$=\infty(1-0)$$
$$\boxed{=\infty}$$

31. Find the limit or show that it does not exist.

$$\lim_{x\to\infty}x\sin\frac{1}{x}$$
$$=\infty\sin 0$$
$$\boxed{=0}$$

37. Find the horizontal and vertical asymptotes of each curve. You may want to use a graphing calculator (or computer) to check your work by graphing the curve and estimating the asymptotes.

$$y=\frac{2x^2+x-1}{x^2+x-2}$$

Horizontal Asymptotes:

$$\lim_{x\to\infty}\frac{2x^2+x-1}{x^2+x-2}$$
$$=\lim_{x\to\infty}\frac{x^2(2+1/x-1/x^2)}{x^2(1+1/x-2/x^2)}$$
$$=\lim_{x\to\infty}\frac{2+1/x-1/x^2}{1+1/x-2/x^2}$$
$$\boxed{=2}$$
$$\lim_{x\to-\infty}\frac{2x^2+x-1}{x^2+x-2}$$
$$=\lim_{x\to-\infty}\frac{x^2(2+1/x-1/x^2)}{x^2(1+1/x-2/x^2)}$$
$$=\lim_{x\to-\infty}\frac{2+1/x-1/x^2}{1+1/x-2/x^2}$$
$$\boxed{=2}$$
$$\boxed{y=2}$$

Vertical Asymptotes;

$$x^2+x-2=0$$
$$(x-1)(x+2)=0$$
$$\boxed{x=1 \text{ or } x=-2}$$
$$\boxed{x=1, x=-2}$$

54. Find the limits as $x \to \infty$ and as $x \to -\infty$. Use this information, together with intercepts, to give a rough sketch of the graph as in Example 11.

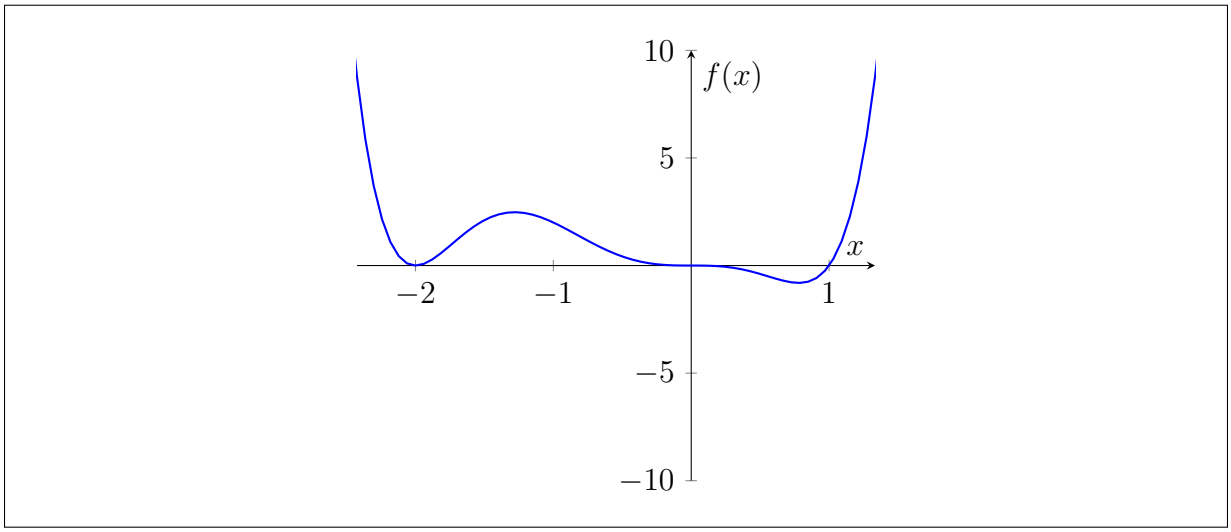
$$y = x^3(x+2)^2(x-1)$$

$$\lim_{x\to\infty} x^3(x+2)^2(x-1)$$

$$\boxed{= \infty}$$

$$\lim_{x\to-\infty} x^3(x+2)^2(x-1)$$

$$\boxed{= -\infty}$$



59. Sketch the graph of a function that satisfies all of the given conditions.

Section 3.5:

5. Use the guidelines of this section to sketch the curve.

$$y = x(x-4)^3$$