

Worksheet 3a

1. Find each of the following limits if they exist. If the limit does not exist, explain why.

a.  $\lim_{x \rightarrow \infty} \left( \frac{-3x^2 + x - 6}{x^2 + 3x - 10} \right)$

b.  $\lim_{x \rightarrow \infty} \left( \frac{7 - 3x^2 - 6x^3}{4x^2 + 3x - 10} \right)$

c.  $\lim_{x \rightarrow \infty} \left( \frac{1}{x} + 1 \right) \left( \frac{5x^2 - 7}{x^2} \right)$

d.  $\lim_{x \rightarrow \infty} \left( \frac{x^2 + x - 6}{4x^3 + 3x - 10} \right)$

e.  $\lim_{x \rightarrow \infty} \left( \frac{3x^2 + x - 7}{10 - 4x - 5x^2} \right)$

f.  $\lim_{x \rightarrow \infty} \left( \frac{3x^3 + 5x^2 - 7}{10x^3 - 11x + 5} \right)$

g.  $\lim_{x \rightarrow -\infty} |x|$

h.  $\lim_{x \rightarrow \infty} \frac{|x|}{|x| + 1}$

i.  $\lim_{x \rightarrow \infty} (\sqrt{x^2 + 1} - x)$

j.  $\lim_{x \rightarrow \infty} (\sqrt{3x^2 + 8x + 6} - \sqrt{3x^2 + 3x + 1})$

k.  $\lim_{x \rightarrow \infty} \left( \sqrt{\frac{12x^3 - 5x + 2}{1 + 4x^2 + 3x^3}} \right)$

l.  $\lim_{x \rightarrow \infty} \left( \frac{9 - 7x - 8x^3}{10 - 3x - 9x^2} \right)$

m.  $\lim_{x \rightarrow \infty} \left( \frac{4x^4 - 9x}{5x - 7x^2 - 11x^4 - 1} \right)$

n.  $\lim_{x \rightarrow \infty} \left( \frac{\sqrt{x^2 - 5x}}{4 - 3x} \right)$

o.  $\lim_{x \rightarrow -\infty} \left( \frac{\sqrt{x^2 - 5x}}{4 - 3x} \right)$

p.  $\lim_{x \rightarrow \infty} \left( \frac{x \sqrt{x}}{\sqrt{5 + x^3}} \right)$

q.  $\lim_{x \rightarrow -\infty} \left( \frac{x \sqrt{x}}{\sqrt{5 + x^3}} \right)$

r.  $\lim_{x \rightarrow \infty} (\sqrt{3x^2 + 8x + 6} - \sqrt{4x^2 + 3x + 1})$

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2. Determine the horizontal asymptotes, if they exist, of the graph of each of the functions given below:

a.  $y = \frac{\sqrt{3x^2 + 1}}{4x - 5}$

b.  $y = \frac{x - 9}{\sqrt{4x^2 + 3x + 2}}$

c.  $y = \sqrt{4x^2 - 7x - 2} - \sqrt{4x^2 + 8x - 1}$