Worksheet 3a – Answers

Math 249 – L02

1a. $\lim_{x\to\infty}\left(\frac{-3x^2+x-6}{x^2+3x-10}\right) = -3$

(b) $\lim_{x\to\infty}\frac{7-3x^2-6x^3}{4x^2+3x-10} = -\infty$

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

(d) $\lim_{x\to\infty}\left(\frac{x^2+x-6}{4x^3+3x-10}\right) = 0$

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

(f) $\lim_{x\to-\infty}\frac{3x^3+5x^2-7}{10x^3-11x+5} = \frac{3}{10}$

(g) $\lim_{x\to-\infty}|x| = \infty$

(h) $\lim_{x\to\infty}\left(\frac{|x|}{|x|+1}\right) = 1$

(i) $\lim_{x\to\infty}\left(\sqrt{x^2+1}-x\right) = 0$

(j) $\lim_{x\to\infty}\left(\sqrt{3x^2+8x+6}-\sqrt{3x^2+3x+1}\right) = \frac{5}{2\sqrt{3}}$

(k) $\lim_{x\to\infty}\sqrt{\frac{12x^3-5x+2}{1+4x+3x^2}} = +\infty$; $\lim_{x\to\infty}\sqrt{\frac{12x^3-5x+2}{1+4x^2+3x^3}} = 2$

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

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

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

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

(p.) $\lim_{x\to\infty}\frac{x\sqrt{x}}{\sqrt{5+x^3}} = 1$

(q) $\lim_{x\to-\infty}\frac{x\sqrt{x}}{\sqrt{5+x^3}}$ does not exist.

$\frac{x\sqrt{x}}{\sqrt{5+x^3}}$ is not defined when $x<0$.

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

2. a. $y=\frac{\sqrt{3}}{4}$ and $y=-\frac{\sqrt{3}}{4}$ are horizontal asymptotes.

b. $y=\frac{1}{2}$ and $y=-\frac{1}{2}$ are horizontal asymptotes.

c. $y=\sqrt{5}/4$ and $y=-\sqrt{5}/4$ are horizontal asymptotes.