Name: _____ Date: _____

Learning Goal 2.2	Limits at infinity and the definition of the derivative

More Questions – Solutions

1. Find the following limits at infinity.

a. $\lim_{x\to\infty} \frac{2x^2-3x+7}{x^2+47x+1}$

$= \lim_{x\to\infty} \frac{2x^2}{x^2}$
$= \lim_{x\to\infty} 2$
$= 2$

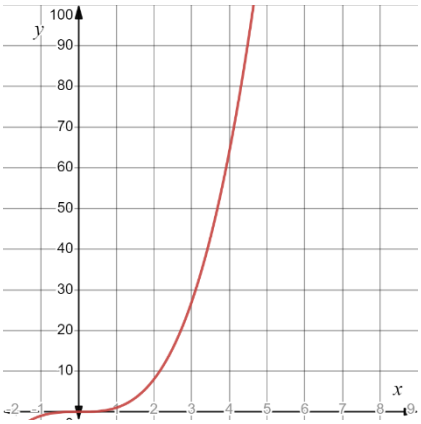
the limit at infinity of a ratio of polynomials is the same as the limit at infinity of their leading terms

b. $\lim_{x\to\infty} \frac{2x^2+3}{5x^2+x}$

$= \lim_{x\to\infty} \frac{2x^2}{5x^2}$
$= \lim_{x\to\infty} \frac{2}{5}$
$= \frac{2}{5}$

c. $\lim_{x\to\infty} x^3 - x$

$= \lim_{x\to\infty} x^3$
$= \infty$



d. $\lim_{x\to-\infty} \frac{5x^3-3x^2+1}{x^2+2x+4}$

$= \lim_{x\to-\infty} \frac{5x^3}{x^2}$
$= \lim_{x\to-\infty} 5x$
$= -\infty$

e. $\lim_{x\to\infty} \frac{5x^3-3x^2+1}{x^4+2x+4}$

$= \lim_{x\to\infty} \frac{5x^3}{x^4}$
$= \lim_{x\to\infty} \frac{5}{x}$
$= 0$

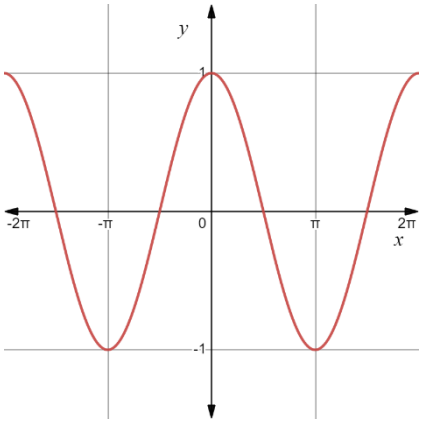
f. $\lim_{x\to\infty} \frac{6}{\sqrt{x^3}}$

$= \lim_{x\to\infty} \frac{6}{x^{3/2}}$
$= 0$

g. $\lim_{x\to\infty} \cos x$

$= \text{DNE}$

the function oscillates between -1 and 1 and thus never converges to a finite number



h. $\lim_{x\to\infty} \frac{2^x}{x^2}$

the numerator grows much faster than the denominator

$= \lim_{x\to\infty} 2^x$

$= \infty$