1) Find each limit if possible.

1a) (a) $\lim\limits_{x\to\infty} \dfrac{x^2 + 2}{x^3 - 1} = 0$

(b) $\lim\limits_{x\to\infty} \dfrac{x^2 + 2}{x^2 - 1} = 1$

(c) $\lim\limits_{x\to\infty} \dfrac{x^2 + 2}{x - 1} = \infty$ (Limit does not exist)

1b) (a) $\lim\limits_{x\to\infty} \dfrac{5 - 2x^{3/2}}{3x^2 - 4}$

(b) $\lim\limits_{x\to\infty} \dfrac{5 - 2x^{3/2}}{3x^{3/2} - 4}$

(c) $\lim\limits_{x\to\infty} \dfrac{5 - 2x^{3/2}}{3x - 4}$

1c) $\lim\limits_{x\to\infty} \dfrac{2x - 1}{3x + 2}$

1d) $\lim\limits_{x\to\infty} \dfrac{x}{x^2 - 1}$

1e) $\lim\limits_{x\to-\infty} \dfrac{5x^2}{x + 3}$

1f) $\lim\limits_{x\to\infty} \dfrac{5x^3 + 1}{10x^3 - 3x^2 + 7}$

2a) $\lim\limits_{x\to\infty}\left(4 + \dfrac{3}{x}\right)$

$= 4 + 0$

$= 4$

2b) $\lim\limits_{x\to-\infty}\left(\dfrac{5}{x} - \dfrac{x}{3}\right)$

2c) $\lim\limits_{x\to-\infty}\left(\dfrac{1}{2}x - \dfrac{4}{x^2}\right)$

3c) $\lim\limits_{x\to-\infty} \dfrac{2x + 1}{\sqrt{x^2 - x}}$

$= \lim\limits_{x\to-\infty} \dfrac{2x+1}{\sqrt{x^2 - x}}$

$= \lim\limits_{x\to-\infty} \dfrac{\sqrt{(2x+1)^2}}{\sqrt{x^2 - x}}$

$= \lim\limits_{x\to-\infty} \sqrt{\dfrac{4x^2 + 4x + 1}{x^2 - x}}$

$= \sqrt{4}$

$= -2$ (negative determined by original problem)

3b) $\lim\limits_{x\to\infty} \dfrac{\sqrt{x^2 - 1}}{2x - 1}$