cálculo 1, stewart, vol 1, ed5, cap 2.6

3 a) $+\infty$ b) $+\infty$ c) $-\infty$ d) 1 e) 2

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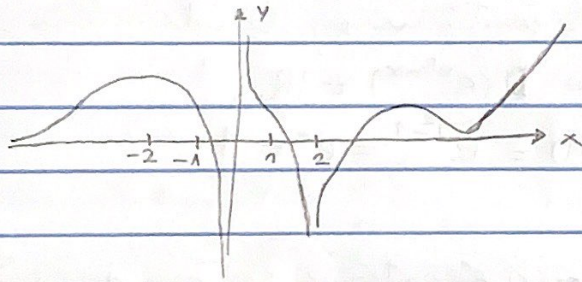

11 $\lim\limits_{x\to\infty} \dfrac{3x^2-x+4}{2x^2+5x-8} = \dfrac{\lim\limits_{x\to\infty} 3x^2-x+4}{\lim\limits_{x\to\infty} 2x^2+5x-8} = \dfrac{+\infty}{+\infty}$

a) $\lim\limits_{x\to\infty} x^2\cdot\left(3-\dfrac{1}{x}+\dfrac{4}{x^2}\right) = \lim\limits_{x\to\infty} x^2\cdot\left(\cancel{\lim\limits_{x\to\infty} 3}^{\,3} - \cancel{\lim\limits_{x\to\infty}\dfrac{1}{x}}^{\,0} + 4\cdot\lim \dfrac{1}{x^2}\right)$

$= \lim\limits_{x\to\infty} x^2\cdot(3-0+4\cdot 0) = \lim\limits_{x\to\infty} x^2\cdot 3$

b) $\lim\limits_{x\to\infty} x^2\left(2+5\cdot\dfrac{1}{x}-8\cdot\dfrac{1}{x^2}\right) = \lim\limits_{x\to\infty} x^2\cdot\left(2+5\cdot\cancel{\lim\limits_{x\to\infty}\dfrac{1}{x}}^{\,0} - 8\cdot\cancel{\lim\limits_{x\to\infty}\dfrac{1}{x^2}}^{\,0}\right)$

$= \lim\limits_{x\to\infty} x^2\cdot(2+5\cdot 0-8\cdot 0) = \lim\limits_{x\to\infty} x^2\cdot 2$

$\rightarrow \dfrac{\lim\limits_{x\to\infty} x^2\cdot 3}{\lim\limits_{x\to\infty} x^2\cdot 2} = \lim\limits_{x\to\infty} \dfrac{\cancel{x^2}\cdot 3}{\cancel{x^2}\cdot 2} = \lim\limits_{x\to\infty} \dfrac{3}{2} = \dfrac{3}{2}$

12 $\lim_{x\to\infty} \sqrt{\frac{12x^3-5x+2}{1+4x^2+3x^3}} = \sqrt{\lim_{x\to\infty} \underbrace{\left(\frac{12x^3-5x+2}{1+4x^2+3x^3}\right)}_{f(x)}} = \sqrt{4} = 2$

$f(x) = \frac{\cancel{x^3}\left(12 - 5\cdot\frac{1}{x^2} + 2\cdot\frac{1}{x^3}\right)}{\cancel{x^3}\left(\frac{1}{x^3} + 4\cdot\frac{1}{x} + 3\cdot 1\right)} \Rightarrow \frac{\lim_{x\to\infty}\left(12-5\cdot\frac{1}{x^2}+2\cdot\frac{1}{x^3}\right)}{\lim_{x\to\infty}\left(3+4\cdot\frac{1}{x}+\frac{1}{x^3}\right)}$

$= \frac{12 - 5\cdot\cancel{\lim_{x\to\infty}\frac{1}{x^2}}^{\to 0} + 2\cdot\cancel{\lim_{x\to\infty}\frac{1}{x^3}}^{\to 0}}{3 + 4\cancel{\lim_{x\to\infty}\frac{1}{x}}^{\to 0} + \cancel{\lim_{x\to\infty}\frac{1}{x^3}}^{\to 0}} = \frac{12}{3} = 4$

13 $\lim_{x\to\infty} \frac{1}{2x+3} = 0$

15 $\lim_{x\to-\infty} \frac{1-x-x^2}{2x^2-7} = \lim_{x\to-\infty} \frac{\cancel{x^2}\left(-1-\frac{1}{x}-\frac{1}{x^2}\right)}{\cancel{x^2}\left(2-7\cdot\frac{1}{x^2}\right)} = \frac{-1-\cancel{\lim_{x\to-\infty}\frac{1}{x}}^{\to 0} - \cancel{\lim_{x\to-\infty}\frac{1}{x^2}}^{\to 0}}{2-7\cdot\cancel{\lim_{x\to-\infty}\frac{1}{x^2}}^{\to 0}}$

$= \frac{-1}{2}$

17 $\lim_{x\to\infty} \frac{x^3+5x}{2x^3-x^2+4} = \lim_{x\to\infty} \frac{\left(1+5\cdot\frac{1}{x^2}\right)}{\left(2-\frac{1}{x}+4\cdot\frac{1}{x^3}\right)} = \frac{1}{2}$

21 $\lim_{x\to\infty} \frac{\sqrt{9x^6-x}}{x^3+1} = \lim_{x\to\infty} \frac{\sqrt{x^6\left(9-\frac{1}{x^5}\right)}}{x^3\left(1+\frac{1}{x^3}\right)} = \lim_{x\to\infty} \frac{\cancel{x^3}\sqrt{\left(9-\frac{1}{x^5}\right)}}{\cancel{x^3}\left(1+\frac{1}{x^3}\right)} = \frac{\sqrt{\lim_{x\to\infty}\left(9-\frac{1}{x^5}\right)}}{1+\cancel{\lim_{x\to\infty}\frac{1}{x^3}}^{\to 0}}$

$= \frac{\sqrt{9}}{1} = 3$

23 $\lim_{x\to\infty} \left(\sqrt{9x^2+x} - 3x\right) \Rightarrow \sqrt{9x^2+x} - 3x \cdot \frac{\sqrt{9x^2+x}+3x}{\sqrt{9x^2+x}+3x}$

$= \frac{\cancel{9x^2}+x-\cancel{9x^2}}{\sqrt{9x^2+x}+3x} = \frac{x}{\sqrt{x^2\left(9+\frac{1}{x}\right)}+3x} = \frac{x}{x\sqrt{9+\frac{1}{x}}+3x} = \frac{\cancel{x}}{\cancel{x}\left(\sqrt{9+\frac{1}{x}}+3\right)}$

$\Rightarrow \lim_{x\to\infty} \frac{1}{\sqrt{9+\frac{1}{x}}+3} = \frac{1}{\sqrt{9}+3} = \frac{1}{6}$