Answer on Question #66015 – Math – Calculus

Question

Evaluate:

$$\lim_{x\to\infty}\left[\sqrt{2x^2+3x-2}-\sqrt{2x^2-3x+2}\right]$$

Solution

$$\lim_{x\to\infty}\left[\sqrt{2x^2+3x-2}-\sqrt{2x^2-3x+2}\right]=$$

$$\lim_{x\to\infty}\left[\frac{[\sqrt{2x^2+3x-2}-\sqrt{2x^2-3x+2}][\sqrt{2x^2+3x-2}+\sqrt{2x^2-3x+2}]}{\left[\sqrt{2x^2+3x-2}+\sqrt{2x^2-3x+2}\right]}\right]=$$

$$\lim_{x\to\infty}\left[\frac{[[2x^2+3x-2]-[2x^2-3x+2]]}{\left[\sqrt{2x^2+3x-2}+\sqrt{2x^2-3x+2}\right]}\right]=$$

$$=\lim_{x\to\infty}\left[\frac{[6x-4]}{\left[\sqrt{2x^2+3x-2}+\sqrt{2x^2-3x+2}\right]}\right]=\lim_{x\to\infty}\left[\frac{[\frac{6x-4}{x}]}{\left[\frac{\sqrt{2x^2+3x-2}+\sqrt{2x^2-3x+2}}{x}\right]}\right]=$$

$$=\lim_{x\to\infty}\left[\frac{\left[6-\frac{4}{x}\right]}{\left[\sqrt{2+\frac{3}{x}-\frac{2}{x^2}}+\sqrt{2-\frac{3}{x}+\frac{2}{x^2}}\right]}\right]=\frac{\lim_{x\to\infty}\left[6-\frac{4}{x}\right]}{\lim_{x\to\infty}\left[\sqrt{2+\frac{3}{x}-\frac{2}{x^2}}+\sqrt{2-\frac{3}{x}+\frac{2}{x^2}}\right]}$$

$$=\frac{\lim_{x\to\infty}[6]-\lim_{x\to\infty}\left[\frac{4}{x}\right]}{\lim_{x\to\infty}\sqrt{2+\frac{3}{x}-\frac{2}{x^2}}+\lim_{x\to\infty}\sqrt{2-\frac{3}{x}+\frac{2}{x^2}}}=\frac{6-0}{\sqrt{2}+\sqrt{2}}=\frac{6}{2\sqrt{2}}=\frac{3\sqrt{2}}{2}$$

Answer: $\frac{3\sqrt{2}}{2}$.