On the next page you will see a solution written by an unexperienced student.

Even though the number $-6\sqrt{3}$ written at the lower right end of the paper is the answer to the question, the solution is not acceptable and would probably receive 4 out of 10 points, if not less, for incompetent writing.

On the last page you will see comments on how to salvage the attempted solution of this student.

Pay attention to such details in your exam because the instructors who read and grade your papers do!

Good luck in your upcoming exam.

Sinan Sertöz

Evaluate the limit $\lim_{x\to 1} \dfrac{x^4+5x-6}{\sqrt{5-2x}-\sqrt{x+2}}$. **(Do not use L'Hôpital's Rule!)**

$$\lim_{x\to 1} \frac{x^4+5x-6}{\sqrt{5-2x}-\sqrt{x+2}} \rightarrow \lim_{x\to 1} \frac{(x^4+5x-6)(\sqrt{5-2x}+\sqrt{x+2})}{(\sqrt{5-2x}-\sqrt{x+2})(\sqrt{5-2x}+\sqrt{x+2})}$$

Multiply by conjugate

$$\lim_{x\to 1} \frac{(x^4+5x-6)(\sqrt{5-2x}+\sqrt{x+2})}{(5-2x)-(x+2)} \rightarrow \lim_{x\to 1} \frac{(x^4+5x-6)(\sqrt{5-2x}+\sqrt{x+2})}{-3(x-1)}$$

$5-2x-x-2$

$3-3x$

polynomoial

$$\begin{array}{l|l} x^4+5x-6 & x-1 \\ x^4-x^3 & x^3+x^2+x+6 \\ \hline x^3+5x-6 & \\ x^3-x^2 & \\ x^2+5x-6 & \\ x^2-x & \\ 6x-6 & \\ 0 & \end{array}$$

$$\lim_{x\to 1} \frac{(x^3+x^2+x+6)(\sqrt{5-2x}+\sqrt{x+2})}{-3}$$

$$\lim_{x\to 1} \frac{(1+1+1+6)(\sqrt{3}+\sqrt{3})}{-3} \qquad \lim_{x\to 1} \frac{(9)(2\sqrt{3})}{-3} = -6\sqrt{3}$$

Evaluate the limit $\lim_{x\to 1} \dfrac{x^4+5x-6}{\sqrt{5-2x}-\sqrt{x+2}}$. **(Do not use L'Hôpital's Rule!)**

$$\lim_{x\to 1} \frac{x^4+5x-6}{\sqrt{5-2x}-\sqrt{x+2}} \overset{(1)}{\cancel{\rightarrow}} = \lim_{x\to 1} \frac{(x^4+5x-6)(\sqrt{5-2x}+\sqrt{x+2})}{(\sqrt{5-2x}-\sqrt{x+2})(\sqrt{5-2x}+\sqrt{x+2})}$$

Multiply by conjugate

$$\overset{(2)}{=} \lim_{x\to 1} \frac{(x^4+5x-6)(\sqrt{5-2x}+\sqrt{x+2})}{(5-2x)-(x+2)} \overset{(3)}{\cancel{\rightarrow}} = \lim_{x\to 1} \frac{(x^4+5x-6)(\sqrt{5-2x}+\sqrt{x+2})}{-3(x-1)}$$

$5-2x-x-2$

$3-3x$

polynomial

$$\begin{array}{l|l} x^4+5x-6 & x-1 \\ \hline x^4-x^3 & x^3+x^2+x+6 \\ x^3+5x-6 & \\ x^3-x^2 & \\ x^2+5x-6 & \\ x^2-x & \\ 6x-6 & \\ 0 & \end{array}$$

$$\overset{(4)}{=} \lim_{x\to 1} \frac{(x^3+x^2+x+6)(\sqrt{5-2x}+\sqrt{x+2})}{-3}$$

$$\overset{(5)}{=} \cancel{\lim_{x\to 1}}^{(6)} \frac{(1+1+1+6)(\sqrt{3}+\sqrt{3})}{-3} \overset{(7)}{=} \cancel{\lim_{x\to 1}}^{(8)} \frac{(9)(2\sqrt{3})}{-3} = -6\sqrt{3}. \quad (9)$$

(1) We do not put $\longrightarrow$ to mean $=$. When you mean $=$, you write $=$. Simple!

(2) In chess if you leave a piece unprotected, it is called a hanging piece and can be captured by your opponent for free. In mathematical writing if you leave an equation hanging, you lose your reader's attention and possible some marks if your reader is marking your exam paper! If you mean $=$, you write $=$. Simple!

(3) We do not put $\longrightarrow$ to mean $=$. When you mean $=$, you write $=$. Simple!

(4) Hanging equation. If you mean $=$, you write $=$.

(5) Another hanging equation.

(6) Here you do not mean lim anymore. You already evaluated the limit.

(7) Hanging equation.

(8) Here you do not write lim. You are just simplifying the limit which you already calculated.

(9) Preferably put a stop when a mathematical sentence ends. This shows you are educated.