Exercise 22

Evaluate the limit, if it exists.

$$\lim_{u\to 2}\frac{\sqrt{4u+1}-3}{u-2}$$

Solution

Rewrite the function and then evaluate the limit.

$$\begin{aligned}
\lim_{u\to 2}\frac{\sqrt{4u+1}-3}{u-2} = \lim_{u\to 2}\frac{\sqrt{4u+1}-3}{u-2}\cdot\frac{\sqrt{4u+1}+3}{\sqrt{4u+1}+3} &= \lim_{u\to 2}\frac{(4u+1)-9}{(u-2)(\sqrt{4u+1}+3)} \\
&= \lim_{u\to 2}\frac{4u-8}{(u-2)(\sqrt{4u+1}+3)} \\
&= \lim_{u\to 2}\frac{4(u-2)}{(u-2)(\sqrt{4u+1}+3)} \\
&= \lim_{u\to 2}\frac{4}{\sqrt{4u+1}+3} \\
&= \frac{4}{\sqrt{4(2)+1}+3} \\
&= \frac{4}{6} \\
&= \frac{2}{3}
\end{aligned}$$