Problem statement Suppose $f(x) = \dfrac{\sqrt{2-\sqrt{4-x^2}}}{x}$.

a) Find $\lim\limits_{x\to 0^+} f(x)$ and $\lim\limits_{x\to 0^-} f(x)$.

Suggestion: Rewrite $f(x)$ as $f(x) = \dfrac{\sqrt{2-\sqrt{4-x^2}}}{x} \cdot \dfrac{\sqrt{2+\sqrt{4-x^2}}}{\sqrt{2+\sqrt{4-x^2}}}$.

b) Sketch the graph of $y = f(x)$ in the viewing window $[-2, 2]\times[-1, 1]$.

c) Use the graph to check your answer to a). Explain any interesting behavior, particularly involving signs.