Section 2.2 and 2.4 Exercises

Adapted from textbook exercises

(1) Determine whether the following statements about the piecewise function $f(x) = \begin{cases} \sin x & x \in [-\pi, 0) \cup (0, \pi] \\ 1 & \text{everywhere else} \end{cases}$ are true or false.
   (a) The limit $\lim_{x\to 0} f(x)$ exists.
   (b) $f(0) = 1$
   (c) $\lim_{x\to 0} f(x) = 1$
   (d) $\lim_{x\to \pi^-} f(x) = \lim_{x\to \pi^+} f(x) = \lim_{x\to \pi} f(x) = 0$

(2) Compute the following limits:
   (a) $\lim_{x\to 5} \frac{x-5}{x^2-25}$
   (b) $\lim_{h\to 1} \frac{h^2+2h-3}{h^2-4h+3}$
   (c) $\lim_{x\to 4} \frac{4x-x^2}{2-\sqrt{x}}$
   (d) $\lim_{h\to 0^+} \frac{\sqrt{h^2+6h+11}-\sqrt{11}}{h}$

(3) Evaluate

$$\lim_{x\to 0^-} x^3 \cos\left(\frac{2}{x}\right).$$