2 (b), (c), page 78. (b) The functions \( g(x) = 1 - x \), \( h(x) = 1 + x \) are continuous on \([0, 1]\) and \( h(x) \neq 0 \) for any \( x \in [0, 1] \). By Theorem 3.22, it then follows that \( f(x) = g(x)/h(x) \) is continuous on \([0, 1]\). \( \square \)

(c) As in part (b), using Theorems 3.22 and 3.24, the function \( f(x) \) is continuous at any \( x \neq 0 \). The only issue is the continuity at 0. But since the function \( \sin(1/x) \) is bounded and \( \sqrt{x} \to 0 \) as \( x \to 0_+ \), from the squeeze theorem for functions (Theorem 3.9 (ii)) it follows that \( \lim_{x \to 0_+} \sqrt{x} \sin(1/x) = 0 \). \( \square \)

4, page 78. The condition \( f(a) < M \) is equivalent to \( M - f(a) > 0 \). Because \( f(x) \) is continuous at \( a \), there exists \( \delta > 0 \) such that

\[-(M - f(a)) < f(x) - f(a) < M - f(a), \quad \forall x \in (a - \delta, a + \delta).\]

The right side of this inequality implies that \( f(x) < M, \quad \forall x \in (a - \delta, a + \delta). \) \( \square \)