3-4  Concavity and the Second Derivative Test
Day 1  p 195 # 12 - 51 x 3's, skip 45

12. \( f(x) = \frac{x^2}{x^2 + 1} \)

The Second Derivative Test: Tests for EXTREMA (max & mins)
Let \( f \) be a function such that \( f'(c) = 0 \) ("c" is a CN of the first
derivative), and the second derivative exists on an open interval.
If \( f''(c) > 0 \), then \( f \) has a relative min @ (c, \( f(c) \))
If \( f''(c) < 0 \), then \( f \) has a relative max @ (c, \( f(c) \))
**If \( f''(c) = 0 \), the test fails. \( f \) may still have extrema, but you
must apply the first derivative test to find them.

41. \( f(x) = x^3 - 3x^2 + 3 \)