New Definition of Continuity (On a Closed Interval):
Up to now, if a function was defined only on [a, b], it could **NOT** be continuous at **a** or at **b**, since continuity required a 2-sided limit to exist.

We will now define **Continuity on a Closed Interval, [a, b]** as follows:

Function f(x) is continuous on [a, b] iff f(x) is continuous on (a, b) and:

1. f(a) & f(b) are both defined.
2. $\lim_{x \to a^+} f(x)$ and $\lim_{x \to b^-} f(x)$ both exist.
3. $\lim_{x \to a^+} f(x) = f(a)$ and $\lim_{x \to b^-} f(x) = f(b)$

Rolle's Theorem: Let f be continuous on the closed interval [a,b] and differentiable on the open interval (a,b). If f(a) = f(b), then there is at least one number, c, in (a,b) such that f '(c) - 0.

Mean Value Theorem (MVT): Let f be continuous on the closed interval [a,b] and differentiable on the open interval (a,b), then there exists a number, c, in (a,b) such that f '(c) = $\frac{f(b) - f(a)}{b - a}$.

The most important use of Rolle's Theorem is to prove the Mean Value Theorem. Additionally, Rolle's Theorem is a special case of the MVT where f(a) = f(b).

These theorems rank under the heading of **Existential Theorems**. They only guarantee the existence of the value c, but they do not give you any direction as to how to compute the value of c.

AP Calculus BC 1
Assignment 119

Find the Taylor Series for f(x) = ln(x), centered at 1
Also do: Page 176, #'s 5, 6, 10, 11, 12, 13, 16, 39, 42, 44, 51