1. Evaluate the limiting values $\lim_{x\to\frac{\pi}{2}} \dfrac{\sec^3 x - \tan^3 x}{\tan x}$

2. Find the maximum and minimum value of the following functions

$$f(x) = 3x^4 + 8x^3 - 30x^2 - 72x - 10$$

3. State Rolle 's Theorem. Verify that the function $f(x) = 2x^3 + x^2 - 4x - 2$ satisfied the hypotheses of Rolle's Theorem are on the interval $\left[-\sqrt{2}, \sqrt{2}\right]$, and find all values of *c* in that interval that satisfy the conclusion of the theorem.

4. State Rolle 's Theorem. Verify that the function $f(x) = x^3 + 2x^2 - 23x - 60$ satisfied the hypotheses of Rolle's Theorem are on the interval $[-4, 5]$, and find all values of *c* in that interval that satisfy the conclusion of the theorem.

5. State Mean-Value Theorem. Verify that the function $f(x) = x^3 + 2x^2 - 11x - 12$ satisfied the hypotheses of Mean-Value Theorem are on the interval $[-5, 4]$, and find all values of *c* in that interval that satisfy the conclusion of the theorem.