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Instructions: Though calculators can be used for all the questions, all problems require you to show your work. Any answer without proper justification will receive **ZERO** credit. Only **EXACT** answers will receive full credit unless otherwise noted.

Use Newton's Method to determine the first positive root of  $f(x) = \tan x - 2x$

1. Determine the formula to find the  $n + 1$  root

$$x_{n+1} = x_n - \frac{\tan x_n - 2x_n}{\sec^2 x_n - 2}$$

2. Use an initial value of  $x = 1.5$  and your calculator to approximate the sought after root. Terminate the process when successive iterations agree to 4 decimal places.

$$1.5 - \frac{\tan(1.5) - 2(1.5)}{\sec^2(1.5) - 2}$$

$$x_0 = 1.5$$

$$x_1 = 1.4439$$

$$x_2 = 1.7620$$

$$x_3 = 1.2682$$

$$x_4 = 1.1962$$

$$x_5 = 1.1686$$

$$x_6 = 1.1656$$

$$x_7 = 1.1656$$

The first positive root of  $f(x) = \tan x - 2x$  is approximately 1.1656, after 7 iterations of Newton's Method.