SOEN 6011 DELIVERABLE ONE

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1 Function Description

$$F2 : \tan x = \frac{opposite}{adjacent} \tag{1}$$

Domain: all real numbers except the values $\frac{\pi}{2} + \pi k$ for all integers k

Co-domain: all real numbers R.

Characteristic:

-Period = π

-X intercepts: x = $k\pi$, where k is an integer.

-Y intercepts: y = 0

-Symmetry: since tan(-x) = - tan(x) then tan (x) is an odd function and its graph is symmetric with respect the origin.

-Intervals of increase/decrease: over one period and from $-\frac{\pi}{2}$ to $\frac{\pi}{2}$, tan (x) is increasing.

-Vertical asymptotes: x = $\frac{\pi}{2}$ + $k\pi$, where k is an integer.

2 Function Requirements

1. The input X shall be a real number.
   -Type attribute: Design Constraints
   -Priority: High

2. The calculation result shall be a real number.
   -Type attribute: Design Constraints
   -Priority: High

3. The user shall input a real number X into the user interface.
   -Type attribute: Functional
   -Priority: High

4. Non-real number input shall be detected by the user interface.
   -Type attribute: Functional
   -Priority: High

5. Empty input shall be detected by the user interface.
   -Type attribute: Functional
   -Priority: High

6. When error inputs are detected, the user interface shall report error messages to users.
   -Type attribute: Functional
   -Priority: High

7. When the user interface receives an approval input X, the user interface shall pass this value X to the function to do the calculation.
   -Type attribute: Functional
   -Priority: High

8. When the function receives a real number X through the user interface, the function shall calculate the result of tan(X).
   -Type attribute: Functional
   -Priority: High

9. When calculation is finished, the result of calculation shall be returned to the user interface.
   -Type attribute: Functional
   -Priority: High

10. When a calculation result tan(X) is returned to the user interface, the user interface shall show the result to the user.
    -Type attribute: Functional
    -Priority: High

11. The calculation result shall be accurate to 6 decimal places.
    -Type attribute: Performance
    -Priority: High

12. Performance: After inputting X, user should receive the calculation result from the function within 20 seconds.
    -Type attribute: Non-Functional
    -Priority: Medium

13. Reusability: The function tan(X) may be composited with other scientific calculation functions to form a scientific calculator.
    -Type attribute: Non-Functional(assumption)
    -Priority: Low

14. Reliability: The function shall return the correct result for any approval input X.
    -Type attribute: Non-Functional
    -Priority: High