Math 4329: Worksheet 03
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Name: _____

1. Calculate $\sqrt{1+x^2}-x$ for $x = 10^2, 10^3$ by direct evaluation. Explain the loss-of-significance error encountered for these large values of x. What can you do to overcome this error ?

2. Calculate the number of significant digits in the error for $x_A = 22/7 \approx 3.1428571$ given that $x_T = 3.14159265$. Also compute the relative error.

3. Recall the quadratic formula to solve:

$$ax^2 + bx + c = 0$$

The two roots x_1 and x_2 are

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}, \quad x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}.$$

For values of $a = 1, b = -40$ and $c = 1$, which root experiences a loss of significance error using $\sqrt{399} \approx 19.975$. Show complete working.