

- 1)
 - a) (2 pts) Compute the relative error in the expression $1 - x^4$ when $x = 1.01$. Use 3 digit, rounded arithmetic.
 - b) (2 pts) Repeat a) using the equivalent expression $(1 - x^2)(1 + x^2)$. Which expression is more accurate?
 - c) (2 pts) Modify the expression in b) to obtain an expression that is even more accurate. Compute the resulting relative error.

NOTE: Be careful about how you compute x^4 .

- 2) Each of the expressions below will suffer from catastrophic cancellation error for the given ranges of x . Rewrite the expressions so that catastrophic cancellation does not occur.
 - a) (1 pt) $\ln(x + 1) - \ln(x)$ for x large
 - b) (2 pt) $\frac{1 - \cos(x)}{x^2}$ for $x \approx 0$.
 - c) (2 pt) $\sqrt[3]{1 + x} - 1$ for $x \approx 0$. (HINT: Use the difference of 2 cubes).