1. What is the condition number of the problem of evaluating

$$\tanh(cx) = \frac{\exp(cx) - \exp(-cx)}{\exp(cx) + \exp(-cx)} \tag{1}$$

   as a function of $c > 0$?

2. (a) Show that

$$\ln(x - \sqrt{x^2 - 1}) = -\ln(x + \sqrt{x^2 - 1}) \tag{2}$$

   (b) Which of the two formulas is more suitable for numerical computation?

3. The IEEE standard specifies 15 bits for the exponent in a 128-bit (quadruple precision) floating point system.

   (a) What is the length of the fraction?

   (b) What is the rounding unit?

   (c) How many significant decimal digits does this word have?

   (d) Why is quadruple precision more than twice as accurate as double precision (64 bits), which is in turn more than twice as accurate as single-precision (32 bits)?