Typical Kahan Challenge (invented by J-M Müller)

"Define functions with: $E(0) = 1$, $E(z) = \frac{e^z - 1}{z}$. $Q[x] = \left| x - \sqrt{x^2 + 1} \right| - \frac{1}{x + \sqrt{x^2 + 1}}$. $H(x) = E(Q(x)^2)$.

Compute $H(x)$ for x = 15.0, 16.0, 17.0, 9999.0. Repeat with more precision, say using BigDecimal."

- Correct answer: (1, 1, 1, 1).

- IEEE 32-bit: (0, 0, 0, 0) **FAIL**

- IEEE 64-bit: (0, 0, 0, 0) **FAIL**

- Myth: "Getting the same answer with increased precision means the answer is correct."

- IEEE 128-bit: (0, 0, 0, 0) **FAIL**

- Extended precision math packages: (0, 0, 0, 0) **FAIL**