A1 Q3

Tuesday, September 21, 2021 3:35 PM

3. We are bounded by the machine epsilon, meaning anything smaller than it will round to 0 in the "nearest" mode. Thus, we just need to see which 10^{-n} values are smaller than the IEEE machine epsilon of 2^{-23}. In decimal, $2^{-23} = 1.19209290e^{-7}$, larger than 10^{-10} and 10^{-15}. This means that rounding 10^{-10} and 10^{-15} into IEEE single comes to 0, so

$1 \oplus \text{round}(10^{-10}) = 1 \oplus 0 = 1$
$1 \oplus \text{round}(10^{-15}) = 1 \oplus 0 = 1$