Problem. Using Regula Falsi method approximates the root of the following equation upto four decimal places.

$$x = e^{-x}.$$

Solution. Let $f(x) = x - e^{-x}$. The function $f(x)$ has the root in the interval $(0,1)$ by Intermediate-Value Theorem, as $f(0) = -1 < 0$ and $f(1) = 1 - \frac{1}{e} > 0$. Let $a_1 = 0$ and $b_1 = 1$.

By Regula Falsi method

$$c_1 = b_1 - \frac{f(b_1)(b_1 - a_1)}{f(b_1) - f(a_1)} = 0.612699837.$$

$f(c_1) = 0.070813948 > 0$, so $a_2 = a_1$ and $b_2 = c_1$.

$$c_2 = b_2 - \frac{f(b_2)(b_2 - a_2)}{f(b_2) - f(a_2)} = 0.572181412.$$

$f(c_2) = 0.007888273 > 0$, so $a_3 = a_2$ and $b_3 = c_2$.

$$c_3 = b_3 - \frac{f(b_3)(b_3 - a_3)}{f(b_3) - f(a_3)} = 0.567703214.$$

$f(c_3) = 0.000877392 > 0$, so $a_4 = a_3$ and $b_4 = c_3$.

$$c_4 = b_4 - \frac{f(b_4)(b_4 - a_4)}{f(b_4) - f(a_4)} = 0.567205553$$

$f(c_4) = 0.000097572 > 0$, so $a_5 = a_4$ and $b_5 = c_4$.

$$c_5 = b_5 - \frac{f(b_5)(b_5 - a_5)}{f(b_5) - f(a_5)} = 0.567150214.$$

$f(c_5) = 0.000010850 > 0$, so $a_6 = a_5$ and $b_6 = c_5$.

$$c_6 = b_5 - \frac{f(b_6)(b_6 - a_6)}{f(b_6) - f(a_6)} = 0.56714406.$$

$|c_6 - c_5| < 0.0001$, so the root $x^* \approx 0.5671$.

Answer. $x^* \approx 0.5671$.