$2^x + 5^{2x} - sinx = e^x$

It can't be solved by standard methods.

Let $f(x) = 2^x + 5^{2x} - sinx - e^x, f'(x) = 2^x ln2 + 2 \cdot 5^{2x} ln5 - cosx - e^x$

$f(-3) = 0.224$

$f(-4) = -0.711$ – it shows that our root lays between -3 and - 4 .

Use a Newton's method

$$a_1 = a - f(a)\frac{b-a}{f(b) - f(a)}$$

$$x_1 = b - \frac{f(b)}{f'(b)}$$

f''(x) > 0 when $x \in [-3, -4]$ and $f(-3) > 0$ then b = -3, a = -4.

$$x_1 = -3 - \frac{f(-3)}{f'(-3)} = -3.216$$

$$a_1 = -4 - f(-4)\frac{-3+4}{f(-3) - f(-4)} = -3.24$$

$$x_2 = -3.216 - \frac{f(-3.216)}{f'(-3.216)} = -3.215$$

$$a_1 = -3.24 - f(-3.24)\frac{-3.216 + 3.24}{f(-3.216) - f(-3.24)} = -3.215$$

Consequently $x \approx -3.215$.