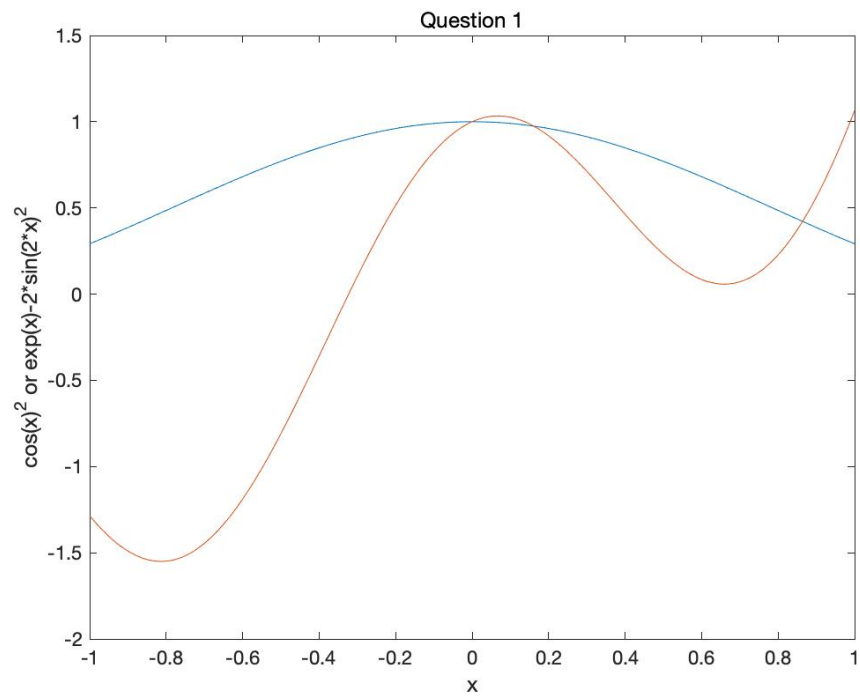# 10001 Project

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1 Question 1

The name of M-file is **Question1**.

2 Question 2

The name of M-file is **Question2**, and the final answer is **0.86402**.

From the question we need to find a solution of $\cos^2(x) = e^x - 2sin^2(2x), by\ Newton-$
$Raphson\ method.$

So I set a function f(x)=cos(x)$^2 - e^x + sin^2(2x),$ and its $derivative$ is $g(x) =$ $2sin(x)cos(x) - e^x + 8cos(2x)sin(2x).$

Then, we can get the iteration formula as x$_{n+1} = x_n - \frac{f(x)}{g(x)}.$

3 Question3

The name of M-file is **Question3**.

(a)The answer is

Value of h	Value of gradient
0.1	5.669942295726054
0.01	5.744729923197434
0.001	5.745484190183725
0.0001	5.745491733496477

Table 1: Question3(a)

(b) The step of differentiate by hand:

y=e$^x - 2sin^2(2x)$

y'=e$^x - 2 \times 2 \times 2 \times sin(2x)cos(2x)$

=e$^x - 8sin(2x)cos(2x)$

The gradient corrects to 7 d.p. is 5.7454918

4 Question4

The name of M-file is **Question4**.
The final output is **0.282924895695441**.