$$f(x) := e^{-x^2} \qquad f1(x) := 1 \qquad f2(x) := x \qquad f3(x) := x^2$$

$$A := \begin{pmatrix} \int_0^1 f1(x)\cdot f1(x)\cdot w(x)\,dx & \int_0^1 f2(x)\cdot f1(x)\cdot w(x)\,dx & \int_0^1 f3(x)\cdot f1(x)\cdot w(x)\,dx \\ \int_0^1 f1(x)\cdot f2(x)\cdot w(x)\,dx & \int_0^1 f2(x)\cdot f2(x)\cdot w(x)\,dx & \int_0^1 f3(x)\cdot f2(x)\cdot w(x)\,dx \\ \int_0^1 f1(x)\cdot f3(x)\cdot w(x)\,dx & \int_0^1 f2(x)\cdot f3(x)\cdot w(x)\,dx & \int_0^1 f3(x)\cdot f3(x)\cdot w(x)\,dx \end{pmatrix}$$

$$B := \begin{pmatrix} \int_0^1 f(x)\cdot f1(x)\cdot w(x)\,dx \\ \int_0^1 f(x)\cdot f2(x)\cdot w(x)\,dx \\ \int_0^1 f(x)\cdot f3(x)\cdot w(x)\,dx \end{pmatrix}$$

$$A = \begin{pmatrix} 1 & 0.5 & 0.333333 \\ 0.5 & 0.333333 & 0.25 \\ 0.333333 & 0.25 & 0.2 \end{pmatrix}$$

$$B = \begin{pmatrix} 0.746824 \\ 0.31606 \\ 0.189472 \end{pmatrix}$$

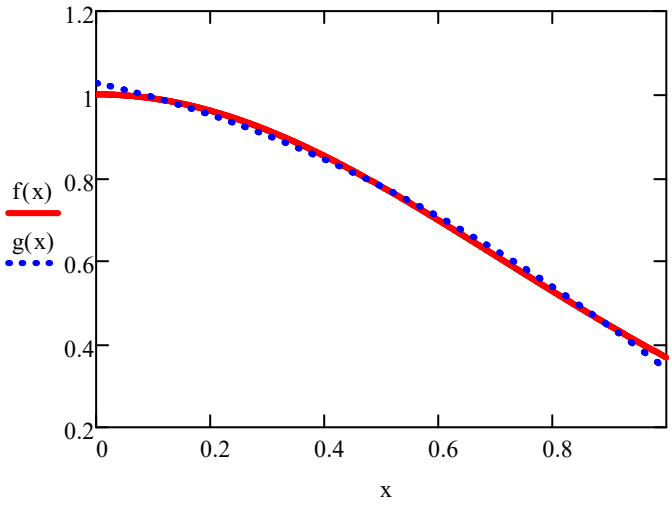
$$X := A^{-1}\cdot B$$

$$X = \begin{pmatrix} 1.02742 \\ -0.30712 \\ -0.3811 \end{pmatrix}$$

$$g(x) := X_0\cdot 1 + X_1\cdot x + X_2\cdot x^2$$

$$E := \sqrt{\int_0^1 f(x)\cdot f(x)\cdot w(x)\,dx - \left(X_0\cdot B_0 + X_1\cdot B_1 + X_2\cdot B_2\right)}$$

$$E = 0.010959$$


1.2
1
0.8
0.6
0.4
0.2
f(x)
g(x)
0
0.2
0.4
0.6
0.8
x

$w(x) := 1$