

Assignment 15

CS374

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1 Taylor's Method for ODE

1.1 Equations

$$Y'(x) = -Y(x) + 2 \cos x$$

$$Y''(x) = Y(x) - 2 \cos x - 2 \sin x$$

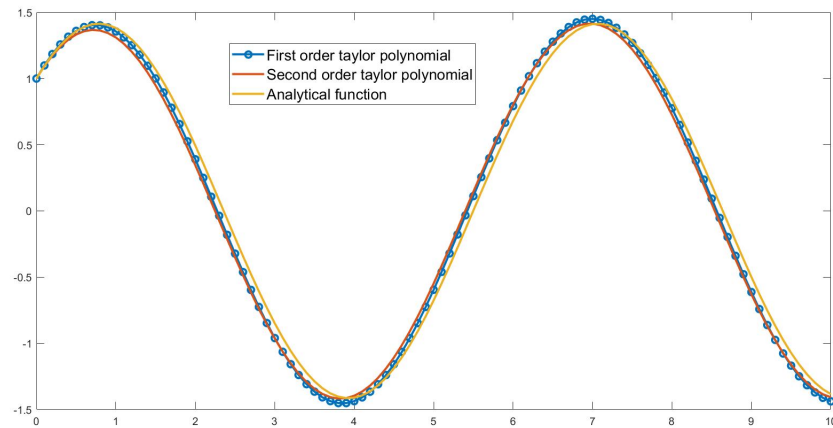
$$Y(x+h) = Y(x) + hY'(x)$$

$$Y(x+h) = Y(x) + hY'(x) + \frac{h^2}{2}Y''(x)$$

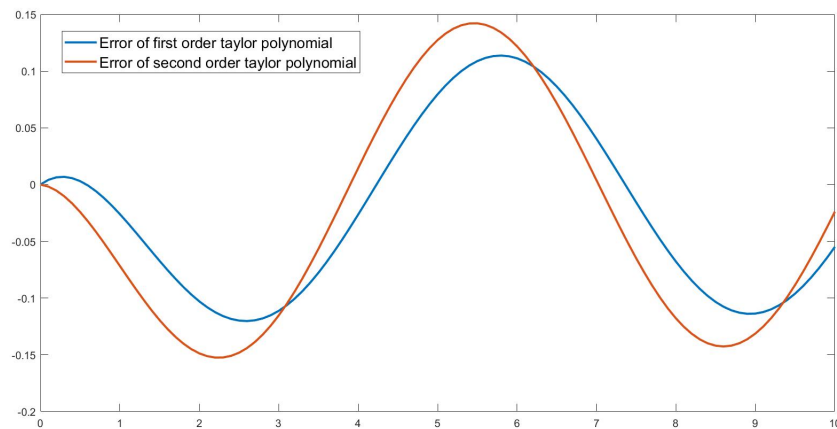
$$Y(x) = \sin x + \cos x$$

1.2 $h = 0.1$

1.2.1 Graph



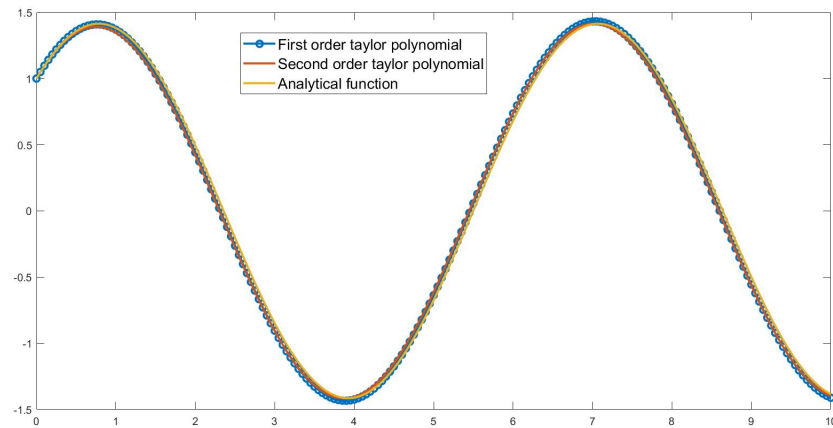
Plot of First, Second Order Taylor Method and Exact Integral solution of the given equation



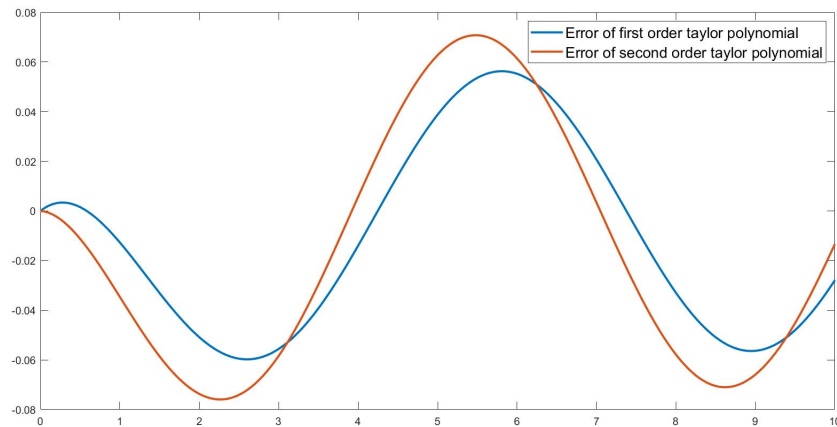
Plot of Error of First and Second Order Taylor Method w.r.t Exact Integral solution of the given equation

1.3 $h = 0.05$

1.3.1 Graph



Plot of First, Second Order Taylor Method and Exact Integral solution of the given equation



Plot of Error of First and Second Order Taylor Method w.r.t Exact Integral solution of the given equation

1.4 Observations

1. On decreasing the value of 'h', Taylor's method for both First Order and Second Order gives better results i.e. less error w.r.t Exact Integral.
2. For both values of 'h'; the increase or decrease in error of second order Taylor method is faster than the increase or decrease in the First order Taylor method.