

TABLE 2.7.2 A Comparison of Exact Solution with Euler Method for Several Step Sizes h for $y' = 3 + e^{-t} - \frac{1}{2}y$, $y(0) = 1$

t	Exact	$h = 0.1$	$h = 0.05$	$h = 0.025$	$h = 0.01$
0.0	1.0000	1.0000	1.0000	1.0000	1.0000
1.0	3.4446	3.5175	3.4805	3.4624	3.4517
2.0	4.6257	4.7017	4.6632	4.6443	4.6331
3.0	5.2310	5.2918	5.2612	5.2460	5.2370
4.0	5.5574	5.6014	5.5793	5.5683	5.5617
5.0	5.7403	5.7707	5.7555	5.7479	5.7433

General Sdms:

$$\frac{dy}{dt} + \frac{1}{2}y = 3 + e^{-t}, \quad y(0) = 1 \rightarrow y = 6 - 2e^{-t} + ce^{-t/2}$$

$$\rightarrow y = 6 - 2e^{-t} - 3e^{-t/2}$$

$$\frac{dy}{dt} - 2y = 4 - t, \quad y(0) = 1 \rightarrow y = -\frac{7}{4} + \frac{1}{2}t + \frac{11}{4}e^{2t}$$

TABLE 2.7.3 A Comparison of Exact Solution with Euler Method for Several Step Sizes h for $y' = 4 - t + 2y$, $y(0) = 1$

t	Exact	$h = 0.1$	$h = 0.05$	$h = 0.025$	$h = 0.01$
0.0	1.000000	1.000000	1.000000	1.000000	1.000000
1.0	19.06990	15.77728	17.25062	18.10997	18.67278
2.0	149.3949	104.6784	123.7130	135.5440	143.5835
3.0	1109.179	652.5349	837.0745	959.2580	1045.395
4.0	8197.884	4042.122	5633.351	6755.175	7575.577
5.0	60573.53	25026.95	37897.43	47555.35	54881.32