

Manual Runge-Kutta.

Below is a table solving the differential equation

$$\frac{dx}{dt} = -1.2x + 7e^{-0.3t}$$

for $t = [0, 1.5]\text{s}$, $h = 0.5\text{ s}$, $x(t = 0) = 3$.

| t | k_1 | k_2 | k_3 | k_4 | x | Analytic Difference |
|-----|----------|---------|----------|---------|-------|---------------------|
| 0 | 1.7 | 0.9371 | 1.166 | 0.5129 | 3 | 0 |
| 0.5 | 0.4541 | 0.1001 | -0.08934 | 4.4614 | 4.264 | 0.1917 |
| 1 | -0.08374 | -0.2460 | -0.1973 | -0.3265 | 4.461 | 0.1381 |
| 1.5 | -0.2955 | -0.3681 | -0.3463 | -0.3986 | 4.212 | 0.04243 |
| 2 | | | | | 3.8 | -0.0351 |