1 Magnus expansion for $A \in \mathbb{R}^{2,2}$, $B = 0$ deterministic

We will concern ourselves with the following SDE:

$$dX_t = A_t X_t dW_t$$

with

$$A_t = \begin{bmatrix} f^{11}(t) & f^{12}(t) \\ 0 & f^{22}(t) \end{bmatrix}$$

Here we chose:

$$A_t = \frac{\tilde{A}_t}{\sigma(\tilde{A}_t)},$$

where $\sigma(A_t)$ is the spectral radius and

$$\tilde{A}_t = \begin{bmatrix} 2 & t \\ 0 & -1 \end{bmatrix}$$

1.1 Parameters

Parameter	value
t_0	0
T	1
N_fine	10001
N	101
M_fine	1000
M	1000
d	2

1.2 Computational Times

Method	Log	Matrix Exp	Total
		Run 1	
exact	0	0	0.811922
euler	0	0	4.50788
m3	0.23501	0.467645	0.702654
		Run 2	
exact	0	0	0.807191
euler	0	0	4.47436
m3	0.212351	0.471555	0.683906
		Run 3	
exact	0	0	0.787258
euler	0	0	4.52251
m3	0.197749	0.500099	0.697848
		Mean Time	
exact	0	0	0.802124
euler	0	0	4.50158
m3	0.215037	0.479766	0.694803