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

$$f^{11}(t) \equiv 2, f^{12}(t) = t, f^{22}(t) \equiv -1,$$

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	0.714152
euler	0	0	4.52561
m1	0.0165656	0.520019	0.536585
		Run 2	
exact	0	0	0.70544
euler	0	0	4.59658
m1	0.0186238	0.51252	0.531143
		Run 3	
exact	0	0	0.706109
euler	0	0	4.63499
m1	0.0162076	0.530074	0.546282
		Mean Time	
exact	0	0	0.708567
euler	0	0	4.58573
m1	0.0171323	0.520871	0.538003