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	0.732955
euler	0	0	4.65614
m2	0.0260034	0.502657	0.52866
		Run 2	
exact	0	0	0.716239
euler	0	0	4.73368
m2	0.0245188	0.517689	0.542207
		Run 3	
exact	0	0	0.70821
euler	0	0	4.57572
m2	0.027459	0.521377	0.548836
		Mean Time	
exact	0	0	0.719135
euler	0	0	4.65518
m2	0.0259937	0.513908	0.539901