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	0.744148
euler	0	0	4.53675
m3	0.0418763	0.512143	0.554019
		Run 2	
exact	0	0	0.715546
euler	0	0	4.5367
m3	0.0441915	0.530973	0.575165
		Run 3	
exact	0	0	0.712495
euler	0	0	4.48352
m3	0.0405003	0.529519	0.570019
		Mean Time	
exact	0	0	0.724063
euler	0	0	4.51899
m3	0.0421894	0.524212	0.566401