Additional exercises

1 Brownian motion

Write a function that simulates a random walk:

1. From a starting position of $x = 0$ and $y = 0$, move a virtual particle by a distance of 1 in a random direction.
2. Repeat $n = 250$ times and plot the track of the particle as a line.
3. Repeat steps 1 and 2 for $N = 500$ virtual particles and visualise their final positions on a scatter plot.

2 Diffusion

Using the code from the previous exercise:

1. Repeat step 3 for $n = 250$, 500, 750 and 1000 iterations and visualise the final positions on a 2×2 panel grid of scatter plots. Adjust the axis limits so that all four panels are plotted at the same scale.
2. Plot the marginal distributions of the x-values as histograms, kernel density estimates and empirical cumulative distribution functions.
3. Visualise the bivariate datasets as 2-dimensional KDEs.