1. Show that if $Z_t = (X_t, Y_t)$ is a 2-dimensional Brownian motion (i.e., X_t and Y_t are independent Brownian motions) and $U \in \mathbb{O}(2)$, then UZ_t is also a 2-dimensional Brownian motion.

2. For $0 \leq t - \epsilon$ and B a standard Brownian motion on $\mathbb{R}$, show that

$$\mathbb{P}[\sup_{t-\epsilon \leq s \leq t} |B(t) - B(s)| > x] \leq 2\mathbb{P}[|B(\epsilon)| > x].$$