spprob5 .tex

## Problems 5. 11.11.2010

Q1. (i) Show that the standard normal distribution N(0, 1) has CF  $e^{-t^2/2}$ . (ii) Deduce that the general normal distribution  $N(\mu, \sigma)$  has CF  $\exp\{i\mu t - \sigma^2 t^2/2\}$ .

Q2. (i) Show that the symmetric exponential distribution SE with density

$$f(x) := e^{-|x|}/2$$

has CF

$$\phi(t) = 1/(1+t^2).$$

(One can do this by Real Analysis – integrate by parts twice.)(ii) Show that the Cauchy distribution with density

$$f(x) = \frac{1}{\pi(1+x^2)}$$

has CF

$$\phi(t) = e^{-|t|}$$

(This uses Complex Analysis, and Jordan's Lemma.)

Q3. Comment on the similarity between density and CF in Q1, and between Q2 (i) and (ii).

NHB