hw_char_fun_normal

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Our goal is to derive the characteristic function for a normal distribution. - (todo) Let

$$X_t = e^{iuW_t}$$

for a brownian motion W. Find

$$\phi(t) = \mathbb{E}[X_t].$$

- (todo) Let

  $$Y \sim \mathcal{N}(\mu, \sigma^2)$$

  be a random variable. Prove that its characteristic function

  $$\phi(u) = \mathbb{E}[e^{iuY}]$$

  is

  $$\phi(u) = e^{iu\mu - \frac{1}{2}u^2\sigma^2}.$$