

Problems from Assignment 10

1. Show that $\Gamma(x + 1) = x\Gamma(x)$.
2. For this problem you may use the fact that the density for the normal distribution is a density. That is you may use the fact that if $\sigma > 0$ and $\mu \in \mathbb{R}$ then:

$$\int_{-\infty}^{\infty} \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} dx = 1.$$

You may also use the fact that the density is symmetric around μ .

- (a) Calculate:

$$\int_0^{\infty} e^{-x^2} dx$$

- (b) Find $\Gamma(\frac{1}{2})$. Hint: Do a substitution and then use the previous part.
- (c) Calculate $\Gamma(\frac{11}{2})$. Hint: Don't do an integral.