

# Advanced Digital Communications (EQ2410)

## Period 3, 2016

### Assignment 7

Due: Thursday, Feb. 11, 2016

M. Xiao

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### *Reading assignment*

- Madhow, Fundamentals of Digital Communication: chapters 8.1-8.2 (pp. 379-397)

### *Preparation tasks*

**Problem 7.1:** For zero-mean Gaussian random variables  $x$  and  $y$  with variance  $\sigma_x^2 = \sigma_y^2 = \sigma^2$  show that

- (1)  $g = x^2 + y^2$  is exponentially distributed,
- (2)  $h = \sqrt{(x^2 + y^2)}$  is Rayleigh distributed.

**Problem 7.2:** Show that/explain why the maximum Doppler shift  $f_D$  experienced by a mobile receiver with speed  $v$  for a wave with frequency  $f$  propagating with speed  $c$  is given by  $f_D = v/c \cdot f$ .