# San Jose State University

# Department of Electrical Engineering

# EE250-02

Fall 2019

# Final Examination

# Duration: 2 hours

##### SOLUTION

# December 11, 2019

## This test consists of five problems.

OPEN BOOK

Use of books, notes, or any other material is allowed.

### Last Name:

**First Name:**

### Student ID:

### 

|  |  |
| --- | --- |
| **Problem** | **Grade** |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |
| Total |  |

Good Luck!

#### Prof. Kamali

**Problem #1 [6 points]:** The probability density function (pdf) of the random variable is given as follows.

Find .

**Solution:**

**Problem #2 [8 points]:** Suppose and are two Gaussian random variables with zero mean and unit variance and the correlation coefficient of . Find the correlation coefficient between and .

**Solution:**

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Similarly

**Problem #3 [9 points]:** Consider the sum process  where 's are iid with Bernoulli distribution (). Find .

**Solution:**

We note that

Therefore

**Problem #4 [9 points]:** The random process is defined as follows.

where and are the arrival times of a Poisson random process with average rate of . Find .

*Hint:*

**Solution:**

**Problem #5 [8 points]:** The received signal of a cellular system is a zero-mean stationary random process with the auto-correlation function where . To obtain independent information about the channel, two uncorrelated samples of are needed. In practice, two samples with covariance of less than 0.1 are considered uncorrelated. Find the time such that covariance between and is 0.1 (hence samples and can be used as uncorrelated samples).

**Solution:**