Spring 2008, Examination #1

1. (a) (answer not provided for question 1(a))
   
   (b) There is a uniformly most powerful test.

2. \[ P_D = 1 - \frac{1}{2}(1 - P_{FA})^2 \]

3. 
   \[
   b = \begin{bmatrix}
   2\mu_{10} \\
   2\mu_{11}
   \end{bmatrix}, \quad c = 2\sigma^2 \ln(2) + \mu_{10}^2 + \mu_{11}^2.
   \]

4. In the solution to this problem you use
   \[
   \hat{\alpha} = \frac{\sum_{n=0}^{N-1} nx(n)}{\sum_{n=0}^{N-1} n^2}.
   \]
   the ML estimate of \( \alpha \).

Fall 2009, Examination #1

1. (a) (answer not provided for question 1(a))
   
   (b) (answer not provided for question 1(b))

2. (a)
   \[
   \ln(\Lambda(x)) = \begin{cases}
   -6, & x < 0 \\
   2x - 6, & 0 < x < 6 \\
   6, & x > 6
   \end{cases}
   \]
   
   (b) \( x > 1 \)
   
   (c) \( P_D = 1 - \frac{1}{2}e^{-5} \)

3. The test is
   \[
   d(x) = \begin{cases}
   d_0, & 3 < x < 10 \\
   d_1, & 0 < x < 2
   \end{cases}
   \]

4. (Solution is a correct derivation.)