

ECEN4503 Exam #1 17 September 2009

1) A random variable X is Uniformly Distributed over the interval from 0 to 10. A random variable Y is generated via $Y = 1/X$.

[25] **Find** $f_Y(y)$. [Answer: $f_Y(y) = 1/(10y^2)$; $y \geq 0.1$]

2) The current provided by a battery pack is known to be Gaussian distributed with a mean of 39 amps and standard deviation of 12 amps. Define the event A to be that the current is > 10 amps, and the event B to be that the current is < 30 amps.

[10] **Compute** $P(A + B)$ [1.0 by inspection of a number line]

[10] **Compute** $P(AB)$ [0.2188]

[5] **Compute** $P(A | B)$ [0.9656]

3) [10] Evaluate the integral $\int_{-\infty}^{\infty} 3 \cos(100\pi \cdot t) \cdot \delta(t + 9.9) dt$
[3.0]

4) There is a 40% chance

Joe Cool studied for this ECEN4503 exam. He will pass the exam with probability 0.8 if he studied and probability 0.1 if he does not study. Suppose Joe Cool passes the test.

[15] **Compute** the probability he did study. [0.8421]

5) A random variable X has PDF $f_X(x) = 0.1\delta(x-1) + 0.3\delta(x-3) + 0.5\delta(x-4) + 0.1\delta(x-7)$.

[10] **Compute** $E[X]$ [3.7]

[15] **Compute** $E[X | X > 3]$. [Hint: Find the conditional PDF $f_X(x | x > 3)$, then take its expected value.] [4.5]