HW 8-2 (Due Nov. 1, 2016) **Name:**

Print then work on it directly. Staple HW 8-1 and 8-2 together.

Problem 1

4.96 Suppose that a random variable Y has a probability density function given by

$$f(y) = \begin{cases} ky^3 e^{-y/2}, & y > 0, \\ 0, & \text{elsewhere.} \end{cases}$$

a Find the value of k that makes $f(y)$ a density function.

b Does Y have a χ^2 distribution? If so, how many degrees of freedom?

c What are the mean and standard deviation of Y?

Problem 2

4.109 The weekly amount of downtime Y (in hours) for an industrial machine has approximately a gamma distribution with $\alpha = 3$ and $\beta = 2$. The loss L (in dollars) to the industrial operation as a result of this downtime is given by $L = 30Y + 2Y^2$. Find the expected value and variance of L.

Problem 3

4.110 If Y has a probability density function given by

$$f(y) = \begin{cases} 4y^2 e^{-2y}, & y > 0, \\ 0, & \text{elsewhere,} \end{cases}$$

obtain $E(Y)$ and $V(Y)$ by inspection.

Find the probability $P(Y > 1)$.

Problem 4

4.123 The relative humidity Y, when measured at a location, has a probability density function given by

$$f(y) = \begin{cases} ky^3(1-y)^2, & 0 \le y \le 1, \\ 0, & \text{elsewhere.} \end{cases}$$

a Find the value of k that makes $f(y)$ a density function.

b. Find $P(0.2 < Y < 0.8)$.

Problem 5

4.126 The weekly repair cost Y for a machine has a probability density function given by

$$f(y) = \begin{cases} 3(1-y)^2, & 0 < y < 1, \\ 0, & \text{elsewhere,} \end{cases}$$

with measurements in hundreds of dollars. How much money should be budgeted each week for repair costs so that the actual cost will exceed the budgeted amount only 10% of the time?

Problem 6

4.128 Suppose that a random variable Y has a probability density function given by

$$f(y) = \begin{cases} 6y(1-y), & 0 \le y \le 1, \\ 0, & \text{elsewhere.} \end{cases}$$

a Find $F(y)$.

b Graph $F(y)$ and $f(y)$.

c Find $P(.5 \le Y \le .8)$.

Problem 7

4.129 During an eight-hour shift, the proportion of time Y that a sheet-metal stamping machine is down for maintenance or repairs has a beta distribution with $\alpha = 1$ and $\beta = 2$. That is,

$$f(y) = \begin{cases} 2(1-y), & 0 \le y \le 1, \\ 0, & \text{elsewhere.} \end{cases}$$

The cost (in hundreds of dollars) of this downtime, due to lost production and cost of maintenance and repair, is given by $C = 10 + 20Y + 4Y^2$. Find the mean and variance of C.