Mat 354

Homework 15

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Due December 2, 2015

1. **EXC3** Y_1 and Y_2 are jointly distributed with density $f(y_1, y_2) = 4y_2^2$ $0 \leq y_1 \leq y_2 \leq 1$

   i. Determine $P(\max\{Y_1, Y_2\} < 1/2)$
   This probability is found by integrating the density as y_1 goes from 0 to y_2 and y_2 goes from 0 to 1/2:

$$\begin{aligned} P(\max\{Y_1, Y_2\} < 1/2) &= \int_0^{1/2} \int_0^{y_2} 4y_2^2 dy_1 dy_2 \\ &= \int_0^{1/2} 4y_2^3 dy_2 \\ &= [y_2^4]_0^{1/2} \\ &= \frac{1}{16} \end{aligned}$$

   ii. Determine $P(Y_1 + Y_2 < 1/2)$

   iii. Determine $P(Y_1 Y_2 < 1/2)$

   iv. Determine $P(Y_1/Y_2 < 1/2)$

   v. Determine $P(Y_1 - Y_2 < 1/2)$

   vi. Determine $P(\min\{Y_1, Y_2\} < 1/2)$

   vii. Determine the marginal distribution for Y_1

   viii. Determine $P(Y_1 < 1/2)$

ix. Determine the marginal distribution for Y_2