# Math 342 —Max and Min of Independent Random Variables

**Problem 1.** Suppose we pick 4 random numbers in the interval $(0, 1)$ independently. Let $M_1$ be their minimum and let $M_2$ be their maximum.

a. Find the CDFs of $M_1$ and $M_2$.

b. Find the densities of $M_1$ and $M_2$.

c. Find the probability that the smallest number is greater than $1/4$.

d. Find the probability that the biggest number is less than $1/2$.

e. Find the expected value of the smallest number.

f. Find the expected value of the biggest number.

**Problem 2.** Suppose the lifetime for a certain brand of lightbulb is modeled with the exponential distribution with a mean lifetime of 5 years. Suppose further that we buy 10 such bulbs and assume that their lifetimes are independent. Let $M$ be the time until the first one dies.

a. Find $P(M > 5)$.

b. Find $E[M]$.