STAT/MA 41600
In-Class Problem Set #7: September 7, 2016
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Problem Set 7 Answers

1. The random variable X is discrete because it only takes on non-negative integer values. The random variable Y is continuous because it takes on non-negative real values.

2. We have $P(X = 0) = 4/16 = 1/4$, and $P(X = 1) = 6/16 = 3/8$, and $P(X = 2) = 4/16 = 1/4$, and $P(X = 3) = 2/16 = 1/8$.

3. We have $P(X = 2) = (36/52)(35/51) = 105/221$, and $P(X = 1) = (36/52)(16/51) + (16/52)(36/51) = 96/221$, and $P(X = 0) = (16/52)(15/51) = 20/221$.

4. The red bears are sitting together with probability $2/5$, and given that they are sitting together, the blue bears are sitting together—and leaving space for the yellow bears—with probability $(4/4)(1/3) = 1/3$. So we get $P(X = 3) = (2/5)(1/3) = 2/15$.

Similarly, the probability that the red bears are sitting together, and the blue bears are sitting together, but the yellow bears are not, is $(2/5)(2/4)(1/3) = 1/15$. Thus $P(X = 2) = (3)(1/15) = 1/5$.

Similarly, the probability that the red bears are sitting together, but the blue bears are not sitting together, and the yellow bears are not sitting together either, is $(2/5)(4/4)(1/3) = 2/15$. Thus $P(X = 1) = (3)(2/15) = 2/5$.

Finally, we get $P(X = 0) = (1/5)(2/3)+(2/5)(1/3) = 4/15$, either by directly considering the possibilities, or by computing the complementary probability.