University of Toronto at Scarborough
CSCA67 / MATA67—Discrete Mathematics, Fall 2017

Exercise #8: Distributing Objects / Probability

Due: November 26, 2017 at 11:59 p.m.
This assignment is worth 3% of your final grade.

Warning: Your electronic submission on *MarkUs* affirms that this exercise is your own work and no one else's, and is in accordance with the University of Toronto Code of Behaviour on Academic Matters, the Code of Student Conduct, and the guidelines for avoiding plagiarism in CSCA67 / MATA67.

This exercise is due by 11:59 p.m. November 26. **Late exercises will not be accepted.**

[5] 1. Repeat #4 of exercise #7, but this time with the restriction that the grocery store just received an undershipment of apples, oranges, pears, and bananas—only 5 pieces each—and there was no fruit in stock earlier. You had better shop early.

[5] 2. How many integer solutions are there to the equation

$$x_1 + x_2 + x_3 + x_4 + x_5 = 72$$

with $x_i \geq 0, i = 1, \ldots, 5$.

[5] 3. Repeat #2, but with $x_1 \geq 0$, $x_2 \geq 1$, $x_3 \geq 2$, $x_4 \geq 3$, and $x_5 \geq 4$.

[5] 4. Consider the experiment of flipping a fair coin 4 consecutive times. Let H represent "heads", and T represent "tails".

(a) Write out the sample space for this experiment. How many elements are in the sample space?

(b) Using the sample space in (a), what is the probability of flipping *exactly* 2 heads in this experiment? What is the probability of flipping *at least* 2 tails?

[5] 5. Repeat # 4, but this time with 100 flips of a fair coin. Is it feasible to write out the sample space? Explain. Calculate the requested probabilities using counting principles only.

[total: 25 marks]