Blackboard exam 1, Mathematics Mathematics 3501, Section ETY6
Starts: 6:55 pm, Thurs, Mar 4; ends: 7:45 pm (late submission loses points).
Instructor: Attila Máté

Follow these instructions carefully:

Show all your work. Your explanations count for much more that simple correct answers. Your wording must be your own; using my words will not earn any credit; your explanations must indicate that you understand the material, not simply copy the explanations from somewhere else.

Do not change the notation in the question. Changing the notation can result in a serious loss of points. In important cases, you may get zero points for changing the notation. This is especially true for proofs that you may find online or in a textbook with a different notation. Changing the notation to a notation you may find in a publicly available source may be taken as evidence of illegitimate copying, and you may be penalized appropriately.

You must work on your own; collaboration will inevitably show up with similar wordings of the explanations and invalidate your answer. Clear signs of cheating will be taken seriously.

Blackboard allows, but will indicate, late submissions. In case of multiple submissions, only the last one will count.

1. *a*) Given the equation

$$x_1 + x_2 + x_3 = 16,$$

how many solutions (x_1, x_2, x_3) does it have, where $x_1 > 0$, $x_2 > 0$, $x_3 > 0$ are integers.

b) How many integer solutions does the equation in Part *a* has if we require instead that $x_1 \ge 0$, $x_2 \ge 0$, and $x_3 \ge 0$.

c) How many integer solutions does the equation in Part *a* has if we require that $x_1 \ge 2$, $x_2 \ge 3$, and $x_3 \ge 5$.

2. *a*) From an urn containing 8 red balls and 6 green balls, six balls are taken without replacement. Determine the probability that 4 of the balls are red and 2 of them are green.

b) Give the probability if the same experiment is performed with replacement, and the same outcome is obtained.

3. *a*) On a certain night soon after sunset in March, the probability that an observer sees a meteor (falling star) in any given second is 6/3600 (note that an hour is 3600 seconds; one mentions seconds here, since one second is a very short time under the circumstances – so 6 is the hourly rate when one measures this rate in very short time intervals). What is the probability that this observer will see exactly k meteors in a given hour ($k \ge 0$)?

b) What is the probability that the same observer will see 4 meteors in a given hour.