01017/01019 Discrete Mathematics E24
Home assignment 2
To be handed in no later than Sunday, October 13 at 11:59pm

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Important regarding the home assignments: Please note that the home assignments must be handed in in groups of two or three students.

Exercise A

1. Prove or disprove that if $a|bc$, where $a, b, c \in \mathbb{Z}$ and $a \neq 0$, then $a|b$ or $a|c$.
2. Prove that if $a \in \mathbb{Z}$, then 5 does not divide $a^2 + 2$.

Exercise B

Do exercise 46 in Section 4.1.

Exercise C

Do Exercises 32 and 44 in Section 4.3.

Exercise D

Do Exercise 8 in Section 4.4.

Exercise E

1. Use the construction in the proof of the Chinese remainder theorem to find all solutions to the system of congruences:

$$\begin{aligned} x &\equiv 1 \mod 3 \\ x &\equiv 3 \mod 4 \\ x &\equiv 2 \mod 5 \end{aligned}$$

2. Solve the system of congruences

$$\begin{aligned} x &\equiv 2 \mod 6 \\ x &\equiv 3 \mod 7 \end{aligned}$$

using back substitution.

Exercise F (Only for groups of size 3)

Do Exercise 36 in Section 4.3.