

Name \_\_\_\_\_ Test 3 – Coronavirus Edition, Spring 2020

**Instructions:**

- The test opened at 10:00am. The test is designed for 50 minutes plus an additional 25 minutes for technical issues dealing with uploading your solutions. The test must be submitted by 11:15am.
- This test is open notes, book, internet, etc. You may use any static resources you like, but may not ask any person for assistance. As such, significantly more points will be weighted on the explanations and work than the answers themselves. Seriously, very clearly show your work, if it looks like a computer algebra system gave you an answer and you don't understand what it means, you will not receive credit.

1) Find  $34 - 18 \cdot 16 \pmod{12}$ . Show your work. (10 points)

2) Solve  $7x + 15 \equiv 42 \pmod{10}$ . Show your work. (10 points)

3) Define the relation  $\preceq$  on  $\mathbb{R}$  via  $x \preceq y$  if and only if  $xy < 10$ . Show that  $\preceq$  is symmetric. (20 points)

4) Define the relation  $\preceq$  on  $\mathbb{R}$  via  $x \preceq y$  if and only if  $xy < 10$ . Provide a counterexample to show that  $\preceq$  is NOT transitive. (20 points)

5) Show that the function  $f: \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x) = 2x + 7$  is one-to-one. (20 points)

6) Find a counterexample to show that the function  $f(x) = 2x^2 + 7$  is not onto. (10 points)

7) Graph the function  $f: \mathbb{Z} \rightarrow \mathbb{R}$  defined by  $f(x) = \frac{1}{2}x$ . (10 points)