MAT 311, Homework 4 due 9/27

1. Solve the following systems of congruences.

(a)

$$\begin{aligned} x &\equiv 3 \mod 5 \\ x &\equiv 2 \mod 8 \\ x &\equiv 0 \mod 7 \end{aligned}$$

(b)

$$\begin{aligned} 13x &\equiv 2 \mod 15 \\ 16x &\equiv 3 \mod 25 \end{aligned}$$

(c)

$$\begin{aligned} 6x &\equiv 12 \mod 15 \\ 3x &\equiv 21 \mod 30 \\ x &\equiv 1 \mod 3. \end{aligned}$$

2. Prove that for each natural n there are n consecutive integers ech divisible by a square greater than 1. **Hint:** use the Chinese remainder theorem.

Please also do questions **14, 25** from section **2.3** and questions **4, 10** from section **2.6**.

When solving congruences, please explain the steps you are doing, don't just plug into any formulas for the solutions. Read the textbook: examples 1, 2, 3 in section 2.3 and examples 11, 12 in section 2.6 are all very useful. You may use the method of the second solution of example 3 in 2.3 even though we didn't discuss it in class.