MATC44 - Practice Problem Set 1

These problems are not for credit and should not be handed in. While working through these problems, be sure to provide ample justification (e.g., a proof, logical argument or counter-example)!

Topics include

- The pigeonhole principle
- Counting
- Colouring proofs
- Induction

The pigeonhole principle

Q1. A container contains 15 red, 12 orange, 10 yellow, 7 green and 5 blue balls. If we randomly select balls from the container, what is the minimum number of balls we must select to guarantee we get 9 balls of the same colour?

Q2. Let $A \subseteq \{1, 2, \ldots, 80\}$ with $|A| = 41$. Show that A contains two elements that are consecutive.