Learning Objective Assessment: C2 (version 1)

MATH2603: Discrete Mathematics

C2: I can count permutations, combinations, and subsets in a variety of scenarios, confidently using the sum and/or product rules as appropriate.

Answer each question below. You may not use a calculator, but you may also leave your answer as a sum, product, and/or quotient of integers. You do not need to simplify.

1. Let $X = \{a, b, c, d, e, f, g, h\}$.
   (a) How many strings over X have length five? (meaning strings with characters in X)
   (b) How many strings over X of length 5 contain the letter a?
   (c) How many strings over X of length 5 contain only a's and b's?
   (d) How many strings over X of length 5 either (contain only a's and b's) or (contain only c's and d's)?
   (e) How many strings over X of length 5 do not have a repeated letter?
2. A box contains a standard billiard ball set: 8 solids and 7 stripes. Note: billiard balls are numbered and have different colors, hence they are distinct.
   (a) How many ways can we select 5 balls from the box?
   (b) How many ways can we select 5 solids?
   (c) How many ways can we select 5 balls that are either all solid or all stripes?
   (d) How many ways can we select 3 solids and 2 stripes?
   (e) How many ways can we select 5 balls that include at least one stripe?

Place work in this box. Continue on back if needed.

Criteria for Satisfactory: At least 8 of 10 responses must be correct.