Beginner Monthly Problem Set

Due: Friday, 17 January 2020

1. How many positive square numbers are factors of 1600?

2. A palindrome is a positive integer whose digits are the same when read forwards or backwards. For example, 2882 is a four-digit palindrome and 49194 is a five-digit palindrome. There are pairs of four-digit palindromes whose sum is a five-digit palindrome. One such pair is 2882 and 9339. How many such pairs are there including this pair?

3. Show all the ways the number 365 can be written as the sum of two or more different perfect square numbers?

4. How many squares on an 8×8 chessboard are more black than white?

5. In triangle ABC, $\widehat{A} = 45°$. Point P is on BC, Q on AB and R on AC such that $BP = QP$ and $CP = RP$. Find $Q\widehat{P}R$.

6. If X and Y are two digits and the five digit number $30XY5$ can be expressed as the product $225 \times n$, find all possible positive integer values of n.

7. The symbol $\lfloor x \rfloor$ means the greatest integer less than or equal to x. For example,

$$\lfloor 5.7 \rfloor = 5 \text{ and } \lfloor 4 \rfloor = 4.$$

Calculate the value of the sum

$$\lfloor \sqrt{1} \rfloor + \lfloor \sqrt{2} \rfloor + \lfloor \sqrt{3} \rfloor + \lfloor \sqrt{4} \rfloor + ... + \lfloor \sqrt{49} \rfloor + \lfloor \sqrt{50} \rfloor$$

8. On a page, there are 10 circles. Any pair of them intersect at exactly 2 points but no 3 of them intersect at one common point. Into how many parts do these circles divide the page?

9. Twelve points are equally spaced on the circumference of a circle. How many different rectangles may be formed by joining any four points at a time?

10. What is the remainder when $6^{2012} + 8^{2021}$ is divided by 49?

Email submission guidelines

- Email your solutions to `samf.training.assignments@gmail.com`.

- In the subject of your email, include your name and the level of the assignment (Beginner, Intermediate or Senior).

- Submit each question in a single separate PDF file (with multiple pages if necessary), with your name and the question number written on each page.

- If you take photographs of your work, use a document scanner such as Office Lens to convert to PDF.

- If you have multiple PDF files for a question, combine them using software such as PDFsam.