BECA / Huson / 11.1 IB Math SL Name:
4 April 2019

Homework: Spicy IB Exam problems

6a. Consider the following sequence of figures.

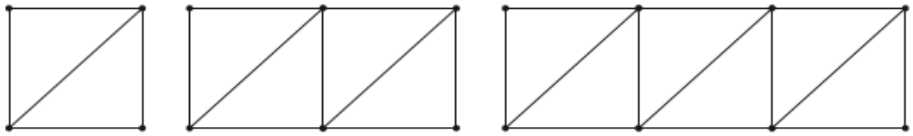

Figure 1 contains 5 line segments.

Given that Figure n contains 801 line segments, show that $n = 200$. *[3 marks]*

6b. Find the total number of line segments in the first 200 figures. *[3 marks]*

7. An arithmetic sequence has the first term $\ln a$ and a common difference $\ln 3$.

The 13th term in the sequence is $8 \ln 9$. Find the value of a. *[6 marks]*

8a. The first two terms of an infinite geometric sequence, in order, are

$2\log_2 x,\ \log_2 x$, where $x > 0$.

Find r. *[2 marks]*

8b. Show that the sum of the infinite sequence is $4\log_2 x$. *[2 marks]*

8c. The first three terms of an arithmetic sequence, in order, are

$\log_2 x,\ \log_2\left(\frac{x}{2}\right),\ \log_2\left(\frac{x}{4}\right)$, where $x > 0$.

Find d, giving your answer as an integer. *[4 marks]*

8d. Let S_{12} be the sum of the first 12 terms of the arithmetic sequence.

Show that $S_{12} = 12\log_2 x - 66$. *[2 marks]*

8e. Given that S_{12} is equal to half the sum of the infinite geometric sequence, find x, giving your answer in the form 2^p, where $p \in \mathbb{Q}$. *[3 marks]*