

# Rules for Senior Section

Rules:

1. You may work in groups of 2 or by yourself (Based on the number students)
2. On your submission, write (in that order):
  - (a) Team number
  - (b) Problem number
  - (c) Answer
3. If you write multiple answers, it will be assumed wrong.
4. Express your answer as exact numbers such as  $\pi$  rather than 3.14.
5. You may not use any computing devices other than your brain.
6. Infinity is a valid answer.
7. Facts you may find useful:
  - (a)  $\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$
  - (b)  $\sum_{n=1}^{\infty} a_n = \lim_{N \rightarrow \infty} \sum_{n=1}^N a_n$
  - (c)  $\prod_{n=1}^{\infty} a_n = \lim_{N \rightarrow \infty} \prod_{n=1}^N a_n$
  - (d)  $\lim_{N \rightarrow \infty}$  just means as  $N$  gets really large
  - (e)  $\lfloor x \rfloor$  is the greatest integer less than or equal to  $x$
  - (f) If  $a_{i,j} \geq 0$  for all  $i, j$  then  $\sum_i \sum_j a_{i,j} = \sum_j \sum_i a_{i,j}$ .

## Sample Problems for Senior

Compute (1 minute)

$$1 + \frac{1}{1 + \frac{1}{1 + \dots}}$$

Compute (2 minute)

$$\prod_{n=0}^{\infty} \left(\frac{1}{2}\right)^{\frac{1}{3^n}}$$

Compute (5 minutes)

$$\sum_{n=0}^{2014} \binom{n}{2}$$