

**Part B**

- (1) Construct a simplicial decomposition, of the torus,  $T^2$ .
  - a. For this simplicial decomposition, compute  $\chi$ .
- (2) Does your simplicial decomposition use the representation of  $T^2$  as a square with the opposite sides identified? If not, can you construct a simplicial decomposition, of  $T^2$  using its representation of a square with the opposite sides identified?
  - a. For this simplicial decomposition of  $T^2$ , compute  $\chi$ .
- (3) For each of your simplicial decompositions of  $T^2$ , compare your values of  $\chi$ .
- (4) Can you make a conjecture about the value of  $\chi$  for different simplicial decompositions of  $T^2$ ?
- <sup>\*</sup>(5) Can you prove your conjecture?

<sup>\*</sup> this is an advanced challenge