

Question 6

Determine whether each of the following series is convergent. (You should name any result or test that you use.)

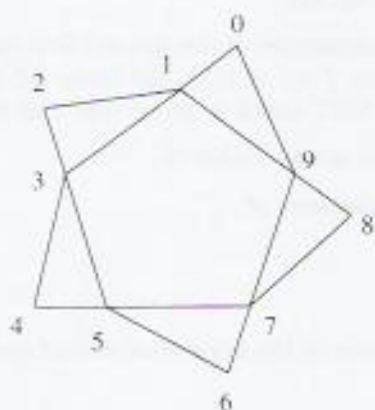
(a) $\sum_{n=1}^{\infty} \frac{n^2 + 3n + 1}{2n^2 + 3}$

(b) $\sum_{n=1}^{\infty} \frac{n^2 + 4}{n^4 - n - 2}$

[5]

Question 7

The figure below is a regular pentagon with identical triangles drawn on each edge.

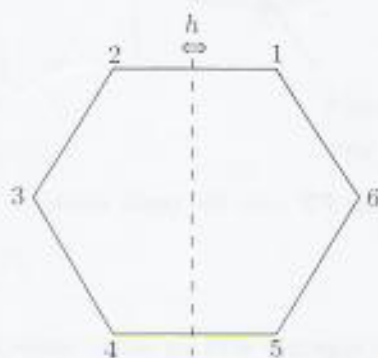


- (a) Write down the set, $S(F)$, of all the symmetries of F , using the numbering of the locations of the vertices shown.
- (b) Decide whether or not $S(F)$ is cyclic. If you think that $S(F)$ is cyclic, explain why and give a generator. If you think that $S(F)$ is not cyclic explain why not.
- (c) Write down all of the subgroups of $S(F)$.

[5]

Question 8

This question is about the group G of symmetries of the regular hexagon shown below.



The symmetry h is reflection in the axis shown and $g = (153)(264)$.

- (a) Write down h in cycle form, using the numbering of locations of vertices shown, and give a geometrical description of g .
- (b) Find the conjugate symmetry ghg^{-1} and identify this symmetry geometrically.
- (c) Two elements of G are $(14)(25)(36)$ and $(16)(25)(34)$. State whether or not these two elements are conjugate in G , justifying your answer briefly.

[5]