

A Book of Abstract Algebra | (2nd Edition)

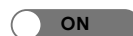


Chapter 30, Problem 2ED



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Problem

A polygon is called *constructible* iff its vertices are constructible points. Prove the following:
The regular hexagon is constructible.

Step-by-step solution

Step 1 of 4

Here, objective is to prove that the regular hexagon is constructible.

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Step 2 of 4

Regular n -gon has n equal length of sides and all angles are equal.

Regular n -gon is constructible if and only if the angle $\frac{2\pi}{n}$ is constructible

An angle $\frac{2\pi}{N}$ is constructible if and only if N is either a power of two or power of two and a set of

Fermat points

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Step 3 of 4

Consider regular Hexagon.

Regular Hexagon is a six-sided Polygon or **6 – gon**

Number of sides $n = 6$

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Step 4 of 4

To verify $\frac{2\pi}{n}$ is constructible or not:

$$\frac{2\pi}{n} = \frac{2\pi}{6}$$

$$6 = 2 \times 3$$

6 is a product of power of two and 3 is a Fermat prime.

Therefore, $\frac{2\pi}{6}$ is constructible angle, which Implies Regular **6 – gon** is constructible.

Hence,

Regular hexagon is constructible.

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