A Book of Abstract Algebra | (2nd Edition)
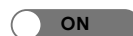
Chapter 30, Problem 3ED	Bookmark	Show all steps: ON

Problem

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

The regular polygon of nine sides is *not* constructible.

Step-by-step solution

Step 1 of 4

Here, objective is to prove that the regular polygon of nine sides is not constructible.

Comment

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 $\dfrac{2\pi}{n}$ is constructible

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

Fermat points

Step 3 of 4

Consider nine-sided Polygon or $9 - \text{gon}$

Number of sides $n = 9$

Step 4 of 4

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

$$\frac{2\pi}{n} = \frac{2\pi}{9}$$
$$9 = 3 \times 3$$

9 is not a product of two distinct $3's$

Therefore, $\dfrac{2\pi}{9}$ is not a constructible angle, which Implies Regular $9 - \text{gon}$ is not Constructible.

Hence,

regular polygon of nine sides is not constructible.

COMPANY

About Chegg

Chegg For Good

College Marketing

Corporate Development

Investor Relations

Jobs

Join Our Affiliate Program

Media Center

Site Map

LEGAL & POLICIES

Advertising Choices

Cookie Notice

General Policies

Intellectual Property Rights

Terms of Use

Global Privacy Policy

Honor Code

Honor Shield

CHEGG PRODUCTS AND SERVICES

Cheap Textbooks

Chegg Coupon

Chegg Play

Chegg Study Help

College Textbooks

eTextbooks

Flashcards

Learn

Chegg Math Solver

Mobile Apps

Sell Textbooks

Solutions Manual

Study 101

Textbook Rental

Used Textbooks

Digital Access Codes

Chegg Money

CHEGG NETWORK

EasyBib

Internships.com

Thinkful

CUSTOMER SERVICE

Customer Service

Give Us Feedback

Help with eTextbooks

Help to use EasyBib Plus

Manage Chegg Study Subscription

Return Your Books

Textbook Return Policy