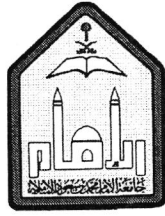


بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Kingdom of Saudi Arabia
Ministry of Higher Education
Al-Imam Mohammed Ibn Saud
Islamic University
- College of Science -
Semester/Year: sem. 2/ 33-34
Duration: 1h30



المملكة العربية السعودية
وزارة التعليم العالي
جامعة الإمام محمد بن سعود الإسلامية
كلية العلوم -
Course Name: Precalculus 2
Course : Math 060

Midterm 1

رَبِّينَ ٠٦٠

الرقم الجامعي	إسم الطالب
	Answer Key

يحتوي الموضوع على ست صفحات

توزيع الدرجات

Items	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6
Marks						

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لا تترك

Question 1 .

Consider the statements

P : 11 is a prime number. and Q : 9 is an even number.

Complete the following table:

(3pts)

Statements	P	Q	$\sim P$	$\sim Q$	$P \wedge (\sim Q)$	$(\sim P) \vee Q$	$P \Rightarrow Q$
(T) or (F)	T	F	F	T	T	F	F

Question 2 .

Complete the following truth table and explain why the statements

$$\sim(P \wedge Q) \text{ and } (\sim P) \vee (\sim Q)$$

are logically equivalent ?

(3pts)

P	Q	$\sim P$	$\sim Q$	$P \wedge Q$	$(\sim P) \vee (\sim Q)$	$\sim(P \wedge Q)$
T	F	F	T	F	T	T
T	T	F	F	T	F	F
F	T	T	F	F	T	T
F	F	T	T	F	T	T

Answer:

we see that they have the same values.

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Question 3 .

1. Let $m \in \mathbb{Z}$. Prove by contrapositive that if $m^2 + m$ is odd, then m is odd. (2pts)

if m 's even then $m^2 + m$ is even.

Answer: *Suppose that m 's even.*

$$\text{then } m = 2k \quad ; \quad k \in \mathbb{Z}$$

$$\begin{aligned} \text{So } m^2 + m &= (2k)^2 + 2k = 4k^2 + 2k \\ &= 2(2k + k) \quad \text{even.} \end{aligned}$$

then if $m^2 + m$ is odd then m 's odd.

2. Disprove the statement:

For all positive integers n , the number $n^3 + 2n$ is odd.

(2pts)

Answer: *Take $n = 2$ then $n^3 + 2n = 8 + 4 = 12$*

then the statement is false.

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Question 4 . Find the first four terms of the sequence

(2pts)

$$a_n = \frac{2n - 1}{n + 1}$$

Answer:

$$a_1 = \frac{2-1}{1+1} = \frac{1}{2}$$

$$a_2 = \frac{4-1}{2+1} = \frac{3}{3} = 1$$

$$a_3 = \frac{6-1}{3+1} = \frac{5}{4}$$

$$a_4 = \frac{8-1}{4+1} = \frac{7}{5}$$

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Question 5 .

Let $(a_n)_n$ be the arithmetic sequence with $a_n = 2n - 1$.

1. Compute the common difference of this sequence.

(2pts)

Answer:

$$a_1 = 2 - 1 = 1$$

$$a_2 = 4 - 1 = 3$$

$$\therefore d = a_2 - a_1 = 3 - 1 = 2$$

2. Find the sum $\sum_{n=1}^{20} (2n - 1)$.

(2pts)

Answer:

$$a_1 = 1 \quad ; \quad a_{20} = 40 - 1 = 39 \quad \text{Arithmetic.}$$

$$\begin{aligned} \therefore \sum_{n=1}^{20} (2n-1) &= S_{20} = \frac{20}{2} (1+39) \\ &= 10 (40) \\ &= 400 \end{aligned}$$

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Question 6 .

Consider the finite geometric series:

$$S_7 = \frac{1}{27} + \frac{1}{9} + \frac{1}{3} + 1 + 3 + 9 + 27.$$

1. Write S_7 using \sum notation.

(2pts)

Answer:

$$a_1 = \frac{1}{27}$$

$$r = \frac{\frac{1}{9}}{\frac{1}{27}} = \frac{1}{9} \times \frac{27}{1} = 3$$

$$\begin{aligned} a_n &= a_1 r^{n-1} \\ &= \frac{1}{27} \cdot (3)^{n-1} \end{aligned}$$

$$\therefore S_7 = \sum_{n=1}^7 \frac{1}{27} (3)^{n-1} = \sum_{n=1}^7 \frac{3^n}{81}$$

2. Compute S_7 .

Answer:

$$S_n = \frac{a_1 (1-r^n)}{1-r} = \frac{a_1 (r^n - 1)}{r-1}$$

(2pts)

$$\begin{aligned} S_7 &= \frac{\frac{1}{27} (1 - (3)^7)}{1-3} = \frac{\frac{1}{27} (3^7 - 1)}{3-1} = \frac{\frac{1}{27} (729 - 1)}{2} \\ &= \frac{\frac{1}{27} \cdot 728}{2} \\ &= \frac{728}{54} \\ &= \frac{364}{27} \end{aligned}$$