بسم الله الرّحمَن الرّحِيم

Kingdom of Saudi Arabia
Ministry of Higher Education
Al-Imam Mohammed Ibn Saud Islamic University
- College of Science -

المملكة العربية السعودية
وزارة التّعليم العَـــالي
جَامِعَة الإمَام مُحَمّد بن سَعُود الإسلامية
-كلّيـــة العُـــلوم-

Semester/Year: sem. 2/ 33-34
Duration: 1h30

Course Name: Precalculus 2
Course : Math 060

Midterm 1

رياضي ٠٦٠

الرّقم الجَامعِي	إسم الطّالب
	Answer Key

يحتوي الموضوع على ست صفحات

توزيع الدّرجات

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

Please, turn over the page

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.

Please, turn over the page.

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 is even then m^2+m is even .

Answer: Suppose that m is even.

then $m = 2k$: $k \in \mathbb{Z}$

so $m^2 + m = (2k)^2 + 2k = 4k^2 + 2k$

$= 2(2k + k)$ even.

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

Please, turn over the page

ادا

Question 4 . Find the first four terms of the sequence **(2pts)**

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

Answer:

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

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

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

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

Please, turn over the page

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:

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

$$\therefore \sum_{n=1}^{20} (2n-1) = S_{20} = \frac{20}{2}(1+39)$$

$$= 10(40)$$

$$= 400$$

Please, turn over the page

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:

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

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

$$a_n = a_1 r^{n-1}$$

$$= \frac{1}{27} \cdot (3)^{n-1}$$

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

2. Compute S_7. **(2pts)**

Answer:

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

$$S_7 = \frac{\frac{1}{27}(1-(3)^7)}{1-3} = \frac{\frac{1}{27}(3^7-1)}{3-1} = \frac{\frac{1}{27}(729-1)}{2}$$

$$= \frac{\frac{1}{27} \cdot \frac{728}{1}}{2}$$

$$= \frac{728}{54}$$

$$= \frac{364}{27}$$

ا.ل.ب