	Alexandria Higher Institute of Engineering & Technology (AIET)		
	Computer Engineering (CE) Department		**2 rd Year**
	MAT 171	**Introduction to Discrete Mathematics**	**I st Semester, 2018-2019**
	Instructor	**Dr Fatma Ahmed**	**Sheet (4)**

Sheet (4)

Elementary Number Theory and Methods of Proof

Question 1:
Assume that r and s are particular integers. Justify your answers to each of the following:
a) Is 6rs even?
b) Is $6r + 8s^2 + 7$ odd?
c) If r and s are both positive, is $r^2 + 2rs + s^2$ composite?

Question 2:
Prove the following statements:
a) There is an integer $n > 5$ such that $2n - 1$ is prime.
b) There are integers m and n such that $m > 1$ and $n > 1$ and is an integer $1/m + 1/n$
c) There are positive integers the sum of whose reciprocals is an integer.
d) There are real numbers a and b such that

Question 3:
Prove the statements that are true and give counterexamples to disprove those that are false.
a) For all integers m and n, if $2m + n$ is odd then m and n are both odd.

b) The product of any two odd integers is odd.

c) The sum of any even and any odd integer is odd.

d) The difference of any even integer minus any odd integer is odd.

a) The product of any even integer and any integer is even.

b) The difference of any two even integers is even.

Question 4:
If today is Tuesday, what day of the week will it be 1,000 days from today?

Question 5:
If m, n, and d are integers and $m \bmod d = n \bmod d$, does it necessarily follow that $m = n$?
That $m - n$ is divisible by d? Prove your answers.

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