



الموقع

Computer Sciences
University of Technology



Date: 17/9/2017

Final Exam. 2016-2017

Subject: discrete mathematics

Time: 3 hours

second trail

Class: first

Lecturers: Akbas E., Ahmed E. & Amar F.

Branch: all

Note : Answer 5 questions only , 14 marks for each

Q1) Prove by induction for $n \geq 1$:

$$1 + 4 + 7 + \dots + (3n - 2) = \frac{1}{2} n (3n - 1)$$

Q2) Sketch the graph of $f: \mathbb{R} \rightarrow \mathbb{R}$ where: $f(x) = x^3 + x^2 + 2$. Determine if $f(x)$ is:

(a) function (b) onto, (c) one-to-one, (d) invertible? (Mention the reasons)

Q3) Suppose that a person deposits 20,000 ID in a savings account at a bank yielding 13% per year with interest compounded annually. How much will be in the account after 38 years?

Q4) In a group of 30 people:

15 run (R),

13 swim (S),

13 cycle (C).

5 run and swim,

8 cycle and swim,

9 run and cycle,

5 do all three activities.

a) How many of the 30 people do not do any of these activities?

b) Fill in the correct number of activities in each of the eight regions of the Venn diagram.

Q5)) Let $U = \{1, 2, \dots, 9\}$ be the universal set,

and let $A = \{1, 2, 3, 4, 5\}$,

$B = \{4, 5, 6, 7\}$,

$C = \{5, 6, 7, 8, 9\}$,

$D = \{1, 3, 5, 7, 9\}$, Find:

(a) A^c, B^c ,

(b) $A \setminus B, B \setminus A$,

(c) $C \setminus D, D \setminus C$;

(d) $A \oplus B, C \oplus D$.

(e) $A \cap C$

(f) $D \cup C$

Q6) Consider the following relations on the set $A = \{1, 2, 3\}$:

$R = \{(1, 1), (1, 2), (1, 3), (3, 3)\}$,

$S = \{(1, 1)(1, 2), (2, 1)(2, 2), (3, 3)\}$,

$A \times A$ = universal relation

Determine whether or not each of the above relations on A is:

(a) reflexive; (b) compatible ; (c) transitive; (d) antisymmetric.

أ. م. عمار فخري مدي

د. اقسام عزالدين

أ. م. أحمد دجوقب يونس