

KING SAUD UNIVERSITY
COLLEGE OF COMPUTER & INFORMATION SCIENCES
DEPT OF COMPUTER SCIENCE

CSC281 Discrete Mathematics

Second Semester 1427/1428 AH

First Mid-term Examination: Monday 21.3.1428 A.H./9.4.2007 C.E. (duration = 2 hours)

Instructor: Dr. Aqil Azmi

Instructions:

- Write your name and id.
- Answer all the questions.
- Write your final answer neatly in the designated space. Try showing your computation as much as possible.
- Use back sheet for scribbling/scratching.

S/N:	Name:	ID:
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1. [Marks 10]

Assume that set $S = \{a\}$, write down the elements of the set $P(P(S))$ where $P(\cdot)$ denotes the powerset of the given set.

2. [Marks 13]

Use mathematical induction to prove that $1 + x + x^2 + \dots + x^n = (x^{n+1} - 1)/(x - 1)$, where $x \neq 1$.

3. [Marks 10]

Let $f(x) = e^x + 1$ and $g(x) = \ln x$. Compute $(f \circ g)(x)$ and $(g \circ f)(x)$.

4. [Marks 15]

Solve the linear congruence equation $34x \equiv 19 \pmod{65}$.

5. [Marks 10]

Use proof by contradiction to prove that the sum of an irrational number and a rational number is irrational.

6. [Marks 12]

Prove that if $7 \nmid n$ then n^2 leaves a remainder of 1, 2 or 4 (only) when divided by 7.

Hint: use proof by cases.

7. [Marks 10]

Determine if the integer 667 is a prime. Show all your computation.

8. [Marks 20]

You are given the sequence $a_{23} = 374$, $a_{24} = 398$, $a_{25} = 423$ and $a_{26} = 449$. Evaluate

the summation $\sum_{i=10}^{30} a_i$. Useful formulas: $\sum_{i=1}^n i = n(n+1)/2$, and

$\sum_{i=1}^n i^2 = n(n+1)(2n+1)/6$. **Hint:** express all a_i in term of a_{23} .