

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

CSC281 Discrete Mathematics

Practice for the Finals

Instructor:

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1. Write the generating function (closed form) to generate the infinite sequence $\langle 0, 1, 0, 1, 0, 1, \dots \rangle$.
2. Suppose you have the function $f: A \rightarrow B$, where A and B are two sets. If $|A| = n$, and $|B| = m$, count how many different 1-1 functions f can you have?
3. Consider the infinite sequence: $a_0 = 10$, $a_1 = 15$, $a_2 = 21$, $a_3 = 29$, and $a_4 = 40$. Write the general formula for the sequence. What is the value of a_{50} (the 50th term).
4. Calculate $\gcd(8^3, (15!)^2)$.
5. How many distinct integer solutions do you have to the equation $A + B + C + D = 20$, if A, B , and $C \geq 1$, and $D \geq 2$.
6. Count the number of distinct words can you produce by re-arranging the letters of the word: MAKKAH.
7. Find all the integer solutions to $4x^2 \equiv 3 \pmod{19}$.
8. Use the *extended binomial* expansion to expand (into 5 terms) and calculate the square root of 1.55.
9. Use induction to show that $\sum_{k=1}^n \frac{1}{k \cdot (k+1)} = \frac{n}{n+1}$.
10. Prove using induction that $n \mid (2^n + 1)$ for all odd integer n .
11. Use proof by contradiction to show that $\sqrt{3}$ is irrational.
12. How many bit strings of length 10 that contains 3 or 4 zeros.
13. Do, but in each case the leftmost and the rightmost bit must be the same.
14. In the expansion of $(3x + x^2 + x^3/2)^{10}$, what is the coefficient of x^{17} .
15. Derive the recurrence relation for the number of bit strings with no 10 in it.