
INSTRUCTIONS

This homework assignment must be completed **individually** (and not in groups). Completing this assignment will set you up to use the tools you'll need for the rest of the course, and will give you and us an idea of your mastery of the prerequisite knowledge before you start the course.

REQUIRED READING Rosen Chapters 1 and 2, Sections 5.1-5.2 (covers prerequisite concepts).

1. Make sure you can access the Gradescope site for this class.
 - Navigate to <http://gradescope.com>.
 - Login with your @ucsd email account.
 - Having trouble? You can manually add this course using **entry code: M462RM**. Please use your official full name when signing up.
2. Enroll in Piazza.
 - Use the signup link: <https://piazza.com/class/ir5eixpr38776x>.

1. Prove using the rules of logarithms that for every $a > 1$ and $b > 1$, $a^{\log_2 b} = b^{\log_2 a}$.
2. Consider the following algorithm

procedure Loops(n : a positive integer)

1. **for** $i := 1$ to n
2. **for** $j := 1$ to n
3. **print** (i, j)

- (a) Write what the algorithm prints when $n = 4$.
 - (b) Describe what the algorithm prints in general terms.
 - (c) How many times does **print** routine get called?
 - (d) Describe (in words) a rule to decide, if (i_1, j_1) and (i_2, j_2) have both been printed for some n then which ordered pair was printed first?
3. Prove by induction that

$$1 + 3 + 5 + \dots + (2n - 1) = n^2$$

for all $n \geq 1$.