

Closed books. Individual test. Do not look at other people's work. Please write legibly.

- 1) Modify the following to correctly grow the region of the triangles t marked ($t.m == \text{true}$) assuming that initially one vertex v is marked ($v.m == \text{true}$) and using markings on both vertices and triangles to grow concentric layers (rings) of triangles around V . The three vertices of triangle t are ($t.a$, $t.b$, $t.c$).

Repeat L times {

For each triangle t {

if ($t.a.m \parallel t.b.m \parallel t.c.m$) {

$t.m = \text{true};$

$t.a.m = \text{true}; t.b.m = \text{true}; t.c.m = \text{true};$ # *remove this line*

};

};

};

For each triangle t {if ($t.m$) { $t.a.m = \text{true}; t.b.m = \text{true}; t.c.m = \text{true};$ } # add this

- 2) Assume that you are using a **binary search** to find the index of the entry in table T that has value V

What assumption about T must hold? *T must be sorted*

If T has 1000 elements, how many tests will you need? *10 or 11*

- 3) The pseudo-code below has a bug.

for ($i=0$; $i < n-1$; $i++$) {

for ($j=0$; $j < n-1-i$; $j++$) {

if ($T[j+1] < T[j]$) { # *insert "temp=T[j];"*

$T[j] = T[j+1];$

$T[j+1] = T[j];$ # *replace by "T'[j+1]=temp;"*

}; };

What was it supposed to do? *Bubble Sort*

What is the bug? *Swap is overwriting itself*

Indicate how to fix it by marking the code above.

- 4) You know that algorithm $X(n)$ is $O(\log(n))$. $X(u)$ took 1mn. $X(v)$ took 2 mns.

I conclude that $v=2u$. Am I right? *No*

Justify my conclusion if correct or rectify it if wrong? *$v=u^2$*

- 5) Explain what a greedy algorithm is.

An algorithm that attempts to minimize some global cost C by selecting at each step the move that minimizes C (the locally optimal choice), without looking ahead to select the globally optimal sequence of moves.
