This document is written using Maple. It is an example of how might do part B #2, assuming you hadn’t found a template for the "gothic tree" (below) anywhere and were making it up....

Step 1: I opened the maple file
http://www.math.utah.edu/~fractals/Lpictures.mws
and executed the worksheet. This loaded the TESTMAP and AFFINE1 procedures which I shall use to define the transformations and make the L-picture diagrams.

Step 2: Stealing and modifying commands from the file
http://www.math.utah.edu/~fractals/Sierpinski.mws
I created a picture five affine transformations which, it seemed to me, would generate a tree-like fractal, and then encoded them using AFFINE1

```maple
> f1:=P->AFFINE1(P,-.6,0,0,.6,.85,.2);
f2:=P->AFFINE1(P,.2,.5,-.6,.3,.3,.3);
f3:=P->AFFINE1(P,-.1,-.4,.6,.3,.5,.7);
f4:=P->AFFINE1(P,-.1,-.4,.05,-.05,.6,.5);
f5:=P->AFFINE1(P,.05,.05,-.1,.5,.5,0);
```

Now I tested the transformations with TESTMAP:

```maple
> TESTMAP([f1,f2,f3,f4,f5]);
```
Let's see what fractal this generates!

```plaintext
> S:={[0,0]}: # initial set consisting of one point
> 5^7; # want less than 200,000 points

> for i from 1 to 7 do
>     S1:=map(f1,S);
>     S2:=map(f2,S);
>     S3:=map(f3,S);
>     S4:=map(f4,S);
>     S5:=map(f5,S);
>     S:=`union`(S1,S2,S3,S4,S5);
> od:

> pointplot(S,symbol=point,scaling=constrained,
>    axes=none,title=`Haunted tree`);
```
Note on contractions! In order for the theory we’ve talking about to apply, each transformation must be a contraction of the plane. There is actually a computation you can do to check whether you’re O.K. If $A$ is the matrix of your transformation function and $\text{transpose}(A)$ is the transposition of it which interchanges rows and columns, then the eigenvalues of $\text{transpose}(A)$ times $A$ are the squares of the maximum and minimum stretching (which varies according to direction) - you want the larger of these numbers to be less than one! For example, the matrix of the left-most box above is

```maple
> with(linalg):
A:=matrix(2,2,[.2,-.06,.5,.3]):
eigenvals(transpose(A)&*A);
Warning, the protected names norm and trace have been redefined and unprotected

A :=
[ 0.2 -0.06 ]
[ 0.5 0.3 ]

0.02243, 0.3612
> sqrt(.3612); #maximum stretch factor for A
0.6010
```

We’ll understand the math which I just claimed, by the end of the course!