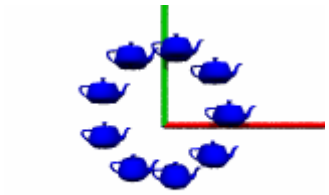
March 6, 2007 Name _____

CS142 *Practice* Problems for Exam 1

Spring 2007

The exam will be closed book. No calculators are to be used.

1) What is a color gamut?
2) What is a metamer?
3) Explain how color is stored on the computer in 32 bits?
4) Qualitatively, what color (e.g. white, green, …) is the RGBA color represented by the bits11111111000000001111111111111111. Explain how your arrived at your answer.
5) Hex triplets are used to specify colors in HTML pages. What is the RGB (24 bit) equivalent of the Hex triplet AA02F0 ?
6) AM radio and Visible light are two different segments of the electromagnetic spectrum. What are 2 other commonly known segments of the electromagnetic spectrum?
7) What is the difference between perspective and orthographic projection? Draw a picture to illustrate the difference. Which one does your eye use?
8) Suppose I want to draw a bunch of upright teapots in a circle of radius 5 in povray as shown below.

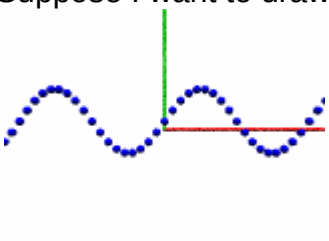


.

Complete the code:

```
#declare cnt = 0;
#while (cnt < 9)
     #declare myAngle = radians(cnt*40);
     object {
         teapot
         translate                                  //complete this line
     }
     #declare cnt = cnt + 1;
#end
```

9) Suppose I want to draw a curve of spheres as shown.



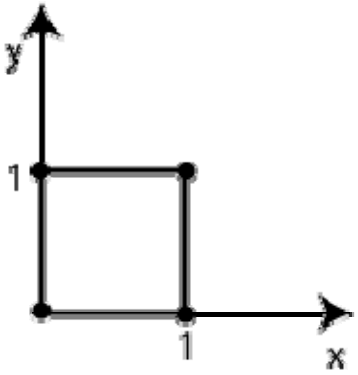
Complete the code:

```
#declare cnt = -50;
#while (cnt < 50)
     #declare myAngle = radians(cnt*20);
     sphere { <0,1,0,>, 0.5  // center and radius
               pigment { Blue }
               translate                //complete this line
     }
     #declare cnt = cnt + 1;
#end
```

10) What are the 2x2 matrices for the following 2D transformations?
   a) Uniform scale by 2 about origin.
   b) A rotation by 30 degrees about the origin.
   c) A rotation by 30 degrees about the point (2,3).
   d) What is the resulting matrix when you first do a scale by 5 along the x direction followed by a rotation by 20 degrees (You must multiply the matrices. Be careful to get the order right!)

11) What are the 3x3 matices using homogeneous coordinates for the following 2D transformations
   a) A translation by 5 along x and -2 along y.
   b) A scale by 4 along x and 2 along y.

12) Suppose you have the following square.



That happens to the square (i.e. draw the result on the above picture) after you apply the shear $\begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$?

13) What is the product of the matrices

$$\begin{pmatrix} 1 & 2 \\ -1 & 1 \end{pmatrix} \begin{pmatrix} 3 & 2 \\ 5 & 1 \end{pmatrix} = \begin{pmatrix} \_ & \_ \\ \_ & \_ \end{pmatrix}?$$

14) Qualitatively describe the diffuse component of the Phong Model? What is the mathematical equation (include a picture).

15) In Povray, pigments, normals, and finishes are used to describe on object's texture. Describe how each affects the texture of an object.