

Homework 3

1. Write the equation of the circle of radius 1 with center at the origin.
2. Write the equation of the circle of radius 5 with center at the origin.
3. Write the equation of the circle of radius 5 with center at $(3, 2)$.
4. Given the equation $x^2 + y^2 = 1$, which describes a circle centered at the origin, derive the equation of an ellipse by applying the transformation $x' = 4x$, $y' = 2y$.
5. What are the x' - and y' -intercepts of the ellipse in the previous problem?
6. Suppose that the near plane of the view frustum is at $z = -1$, the far plane is at $z = -10$, the horizontal field of view is 90° , and the aspect ratio is $4/3$. What are the x and y dimensions of the view frustum at the near plane and the far plane?
7. Let a line be described parametrically as $x = t$, $y = 2t$, and $z = 3t$. Find the points of intersection of this line with the cube $-1 \leq x \leq 1$, $-1 \leq y \leq 1$, $-1 \leq z \leq 1$.
8. Suppose that the viewport coordinates are $0 \leq x \leq 640$ and $0 \leq y \leq 480$. Find the coordinates of the rectangle in the lower right corner that is half the width of the viewport and half the height of the viewport.
9. Continuing the previous problem, find the coordinates of the rectangle in the center of the viewport and that has half the width and height of the viewport.