

Name: \_\_\_\_\_

Score: \_\_\_\_\_ /20

# Lines and Planes

1. Find an equation of the line that passes through the points  $(1, 3, -1)$  and  $(-2, -1, 5)$ .
2. Find an equation of the plane that contains the point  $(2, 1, -5)$  and is parallel to the plane with equation  $4x - 12z = 7y + 2$ .
3. Find all value(s) of  $t$  where the line  $\vec{r}(t) = \langle 1 - t, t, t \rangle$  intersects the sphere  $x^2 + y^2 + z^2 = 4$ .
4. Are the planes  $2x - y - z = 3$  and  $2x + 2y + z = 1$  parallel, orthogonal, or neither? Be sure to justify your answer.
5. Do the four points  $P(1, 1, 3)$ ,  $Q(2, -4, -1)$ ,  $R(2, 0, 2)$ , and  $S(3, -1, 1)$  all lie in a single plane? If so, find an equation of the plane, and if not, explain why not.
6. Find an equation of the plane that contains the line  $\vec{r}(t) = \langle 4 - 2t, t, 5 - 4t \rangle$  and the point  $(1, 1, 1)$ .
7. Determine the equation of two planes whose intersection is the  $y$ -axis. Neither plane that you use can be the  $xy$ -plane or  $yz$ -plane.