

M20550 Calculus III Tutorial
Worksheet 2

1. Find an equation of the plane passes through the point $(1, 1, -7)$ and perpendicular to the line $x = 1 + 4t$, $y = 1 - t$, $z = -3$.
2. Let ℓ be the line of intersection of the planes given by equations $x - y = 1$ and $x - z = 1$. Find an equation for ℓ in the form $\mathbf{r}(t) = \mathbf{r}_0 + t\mathbf{v}$.
3. How many times does a particle traveling along the curve $\mathbf{r}(t) = \langle t^2 + 1, 2t^2 - 1, 2 - 3t^2 \rangle$ hit the plane $2x + 2y + 3z = 3$? What is the point(s) of intersection?
4. Let P be a plane with normal vector $\langle -2, 2, 1 \rangle$ passing through the point $(1, 1, 1)$. Find the distance from the point $(1, 2, -5)$ to the plane P .
5. Find an equation of the plane that passes through the point $(1, 2, 3)$ and contains the line $\frac{1}{3}x = y - 1 = 2 - z$.
6. Find a vector function that represents the curve of intersection of the cylinder $x^2 + y^2 = 9$ and the plane $x + y - z = 5$.
7. Give a vector valued function that describes the position of a particle that starts at the point $(0, 1)$ at time $t = 0$ and then moves along the unit circle in the xy -plane clockwise.
8. Imagine a wheel of unit radius rolling from left to right along the x -axis in the xy -plane with a constant angular velocity of $\frac{1 \text{ rad}}{\text{sec}}$. Let p be the point on the wheel that has coordinates $(0, 0)$ at time $t = 0$. Find a vector valued function that describes the position of p at time t . What if the wheel had radius a ? (The curve traced out by the motion of this point is called a cycloid.)