Summary of lecture 2 - Surfaces and defining gradients

- More surfaces: A plane with normal vector $\mathbf{n} = (\alpha, \beta, \gamma)$ has equation $\alpha x + \beta y + \gamma z = \delta$,
- The graph of $f(x, y) = ax + by + c$ is the plane $z = ax + by + c$ with normal $(a, b, -1)$ passing through the point $(0, 0, c)$.
- Let $z = f(x, y)$ then the partial derivatives are:

$$\frac{\partial f}{\partial x}(a, b) = \text{derivative w.r.t. } x \text{ with } y \text{ constant}$$

$$\frac{\partial f}{\partial y}(a, b) = \text{derivative w.r.t. } y \text{ with } x \text{ constant}$$

- $\frac{\partial f}{\partial x}(a, b)$ is the tangent to the surface f at the point (a, b), where y is fixed and we examine the gradient in the x-direction. (See g(x) below).