Question 3: The surface $z = \sqrt{x+y}$ intersects the plane $y = 3$ along a curve C. Find the parametric equations for the tangent line to this curve at the point $P(1, 3, 2)$.

$$z = \sqrt{x+y}, y = 3 \rightarrow z = \sqrt{x+3} \rightarrow z' = \frac{2(x+3)+x}{2\sqrt{x+3}} = \frac{3(x+2)}{2\sqrt{x+3}}$$

Evaluating using $P(1, 3, 2)$:

$$z' = \frac{9}{4}$$

Using a general point slope equation, and the point P(1,3,2) as my point:

$$(z-2) = \frac{9}{4}(x-1) \rightarrow z = \frac{9}{4}x - \frac{9}{4} + 2 \rightarrow z = \frac{9}{4}x - \frac{1}{4}$$

To parametrize, let $x = t$. It follows that:

$$x = t$$

$$y = 3$$

$$z = \frac{9}{4}t - \frac{1}{4}$$