4.9

4.9 The components of a velocity field are given by $u = x + y$, $v = xy^3 + 16$, and $w = 0$. Determine the location of any stagnation points ($V = 0$) in the flow field.

$V = \sqrt{u^2 + v^2 + w^2} = \sqrt{(x+y)^2 + (xy^3+16)^2} = 0$

or

$u = x + y = 0$ so that $x = -y$

and

$v = xy^3 + 16 = 0$ so that $xy^3 = -16$

Hence, $(-y)y^3 = -16$, or $y = 2$

Therefore, $V = 0$ at $\underline{\underline{x = -2,\ y = 2}}$