Given: The y component of velocity for a steady, incompressible flow in the y-z plane is
\[ v = Ay^2/z \], where \( A = 2 \text{ m/s} \), \( \tau \) is in \( \text{N} \).

Find: simplest \( z \) component.

Solution: Apply differential form of conservation of mass

For two-dimensional, incompressible flow,
\[ \frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = 0 \]
Thus \[ \frac{\partial u}{\partial x} = -\frac{\partial v}{\partial y} = -Ay^2/z \]

Integrating,
\[ u = 2Ay + f(y) \]
The simplest form is for \( f(y) = 0 \)

Thus,
\[ u = 2Ay/z \]

and
\[ \nabla^2 \psi = 4 \frac{\partial^2 \psi}{\partial x^2} + 2 \frac{\partial^2 \psi}{\partial y^2} \]