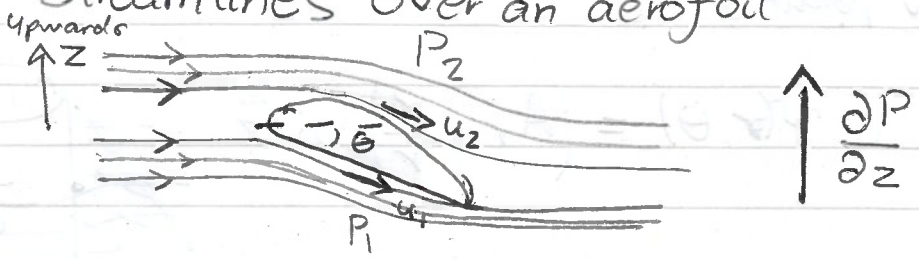
PS1 Q.7 - How does an airplane wing generate lift?

Streamlines over an aerofoil




In the upward direction there ~~are~~ is drop in pressure from a region with closely packed streamlines (high pressure) ~~to~~ below the wing to more broadly-spaced (low pressure) above the wing.

Bernoulli's principle

$$P_2 - \rho\phi_2 - \frac{1}{2}\rho u_2^2 = P_1 - \rho\phi_1 - \frac{1}{2}\rho u_1^2$$

~~Assuming the change in gravitational potential $\phi$ is negligible compared to the press~~ the

Assuming the change in gravitational potential of the air is negligible, so the ~~upward~~ pressure ~~is~~ difference is

$$\Delta P = \frac{1}{2}\rho(u_1^2 - u_2^2)$$

Difference in kinetic energy density

The upward pressure component results in lift.

pto.