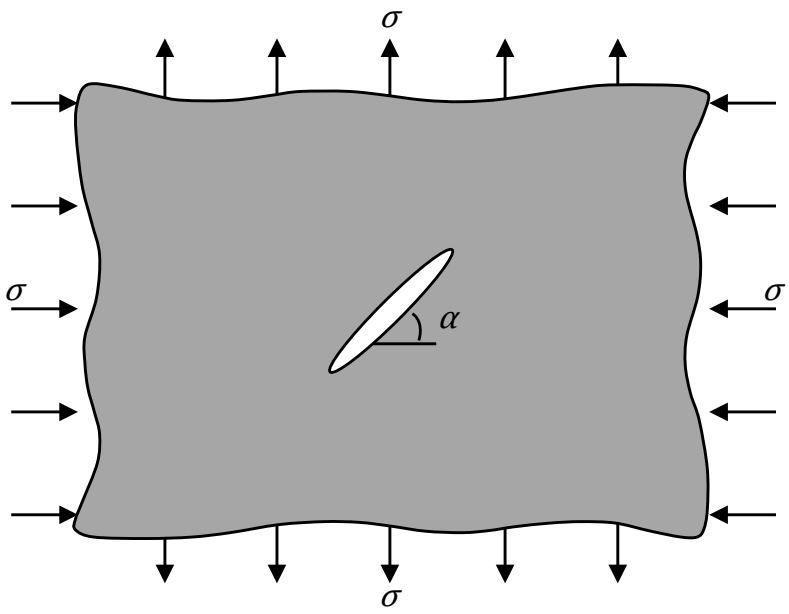
A? Problem 3.1 (5 pts)

Consider the thin plate shown below with a crack of length $2a = 60\,\text{mm}$ at an angle $\alpha = 20°$.

(a) Find expressions for the mode I and mode II stress intensity factors. Express your results as a function of the applied stress σ.

(b) Estimate the maximum stress σ that the plate can support provided that it is made from an aluminium alloy with a Young's modulus $E = 70\,\text{GPa}$ and a toughness $G_c = 12\,\text{kJ/m}^2$.



A? Problem 3.2 (5 pts)

A crack is loaded in a mixed-mode scenario where $K_I = K_{II}$. Find the direction θ, relative to the initial crack plane, in which the crack will propagate. Hint: don't hesitate to use a numerical approach to solve this equation.