Problem 1 (60 points)

Given the reservoir conditions below, and a desire to keep beakout widths as small as possible for wellbore stability, which direction and type of well (e.g. vertical, horizotonal, $\phi = 20°$, etc.) would be the safest to drill. Support your recommendation with a figure. Preferably one that quantatively shows the expected wellbore breakout widths for a given drilling trajetory.

You can assume a Mohr-Coloumb failure criterion with an unconfined compressive strength of the rock of 34 MPa and an internal friction of $\mu_I = 1$. The Poisson ratio is $\nu = 0.2$.

$S_{Hmax} = 115$ MPa in the direction N30°E

$S_{hmin} = 90$ MPa

$S_v = 70$ MPa

$P_p = P_m = 33$ MPa