MEEN 5331: Advanced Materials Science
(HW 5, Due on November 3, 2023)

1. Consider a flat plate of some metal alloy that is to be exposed to repeated tensile-compressive cycling in which the mean stress is 25 MPa. If the initial and critical surface crack lengths are 0.15 and 4.5 mm, respectively, and the values of m and A are 3.5 and 2×10^{-14}, respectively (for   in MPa and a in m), estimate the maximum tensile stress to yield a fatigue life of 2.5×10^7 cycles. Assume the parameter Y