EOSC433/536 Final Exam Formula Sheet

$\tau = c + \sigma_n \tan\phi$ $\tau = c' + (\sigma_n - u)\tan\phi'$

$\sigma_n = 0.5(\sigma_1 + \sigma_3) + 0.5(\sigma_1 - \sigma_3)\cos 2\beta$
$\tau = 0.5(\sigma_1 - \sigma_3)\sin 2\beta$

$\sigma_1 = 0.5(\sigma_x + \sigma_y) + 0.5\left[(\sigma_x - \sigma_y)^2 + (2\tau_{xy})^2\right]^{0.5}$
$\sigma_3 = 0.5(\sigma_x + \sigma_y) - 0.5\left[(\sigma_x - \sigma_y)^2 + (2\tau_{xy})^2\right]^{0.5}$

$\sigma_1 = \dfrac{2c\cos\phi + \sigma_3(1+\sin\phi)}{1-\sin\phi}$

$\beta = \dfrac{\pi}{4} + \dfrac{\phi}{2}$ $2\beta = \tan^{-1}\left(\dfrac{2\tau_{xy}}{\sigma_x - \sigma_y}\right)$

$u_{rr} = \dfrac{\sigma_v a^2}{4rG}\left\{(1+k) - (1-k)\left[4(1-\nu) - \dfrac{a^2}{r^2}\right]\cos 2\theta\right\}$

$u_{\theta\theta} = \dfrac{\sigma_v a^2}{4rG}\left\{(1-k)\left[2(1-2\nu) + \dfrac{a^2}{r^2}\right]\sin 2\theta\right\}$

$\sigma_{rr} = \dfrac{1}{2}\sigma_v\left\{(1+k)\left(1 - \dfrac{a^2}{r^2}\right) - (1-k)\left(1 - 4\dfrac{a^2}{r^2} + 3\dfrac{a^4}{r^4}\right)\cos 2\theta\right\}$

$\sigma_{\theta\theta} = \dfrac{1}{2}\sigma_v\left\{(1+k)\left(1 + \dfrac{a^2}{r^2}\right) + (1-k)\left(1 + 3\dfrac{a^4}{r^4}\right)\cos 2\theta\right\}$

$\tau_{r\theta} = \dfrac{1}{2}\sigma_v\left\{(1-k)\left(1 + 2\dfrac{a^2}{r^2} - 3\dfrac{a^4}{r^4}\right)\sin 2\theta\right\}$

$Q = \dfrac{RQD}{J_n} \times \dfrac{J_r}{J_a} \times \dfrac{J_w}{SRF}$

$\sigma_1 = \sigma_3 + \sigma_{UCS}\left(m_b \dfrac{\sigma_3}{\sigma_{UCS}} + s\right)^a$

$\sigma_v = \rho g z$ $T_o = Pc' - Pr$ $\sigma_H = 3\sigma_h + T_o - P'_c - P_o$ $\sigma_h = P_s$

$u_r = \dfrac{p_o \cdot a}{2G}$ $u_r = \dfrac{a}{k} P_r + u_o$ $k = \dfrac{E_c}{(1+\nu_c)} \dfrac{a^2 - (a - t_c)^2}{(1-2\nu_c)a^2 + (a-t_c)^2}$

$\sigma_v = \rho g z$ $K = \dfrac{\sigma_h}{\sigma_v}$ $K = \dfrac{\nu}{1-\nu}$

$FS = \dfrac{cA + \left[W\cos\Psi_p - U - V\sin\Psi_p + T\cos\theta\right]\tan\phi}{W\sin\Psi_p + V\cos\Psi_p - T\sin\theta}$