Lab Practical (Answer Sheet) - <u>Wedge Analysis of Underground Excavations</u>

Below, enter the answers you obtain when prompted to do so during the different exercises:

Part A – By Hand

1. What is the volume of the maximum wedge you calculated through your wedge volume construction?

Part B – Computer Aided

1. What is the volume of the maximum wedge you calculated using UNWEDGE?

2. What is the Factor of Safety for the maximum wedge where c = 0 MPa and ϕ = 40°? <u>Why</u>?

3. What is the Factor of Safety for the maximum wedge where the tensile strength for the joints is 0.01 MPa due to the presence of intact rock bridges?

4. What is the Factor of Safety for the maximum wedge after bolt support is added:

    - assuming the presence of intact rock bridges?   _____

    - assuming the absence of intact rock bridges?   _____

5. a) What is the minimum tensile capacity (MN) for the specified bolting pattern, while maintaining the minimum factor of safety called for in the design?

   b) What is the minimum number of bolts per 10 m length of tunnel, assuming a bolt tensile capacity = 0.1 MN, while maintaining the minimum factor of safety called for in the design?

          Minimum # of bolts: _____

          In-plane spacing: _____

          Out-of-plane spacing: _____

          Out-of-plane offset: _____

Part C – Influence of Stresses on Wedges

1. Comment on the maximum wedges that form (e.g. volume in m^3, factor of safety, etc.) and note those that may be problematic (as prompted in step 3).

2. How does the *in situ* stress field affect the Factor of Safety for any roof wedges (as prompted in step 4)?