

Problem # 1

A cutting is to be excavated in clay stratum. The clay has the following properties:

$$\gamma = 18 \text{ kN/m}^3$$

$$c = 25 \text{ kN/m}^2$$

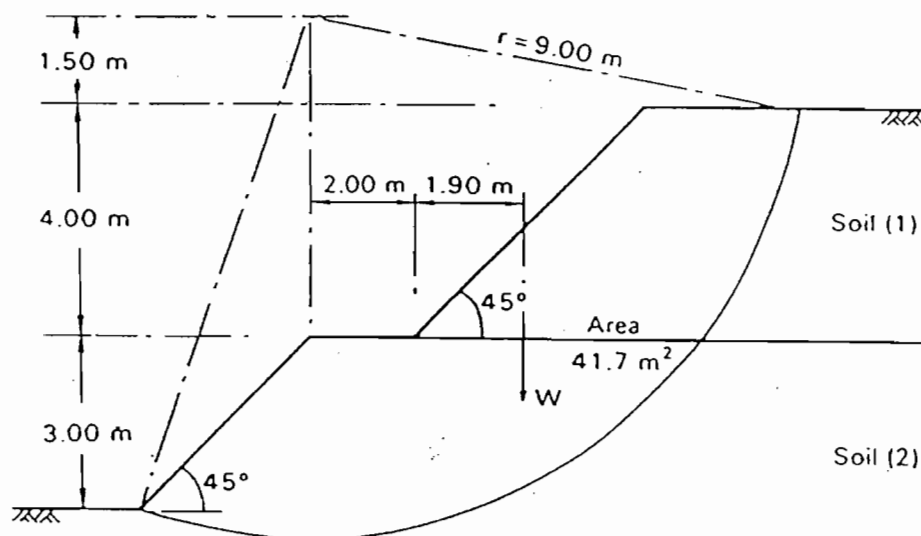
$$\phi = 20^\circ$$

Assuming that the failure surface is planar, find:

- The maximum slope angle of the slope if its height is 10 m.
- The maximum height of the slope if it is excavated at an angle equal to 30° .
- Repeat (a) and (b) for purely cohesive soil.

Problem # 2

Determine the factor of safety for the slope detailed in the figure below. for the given failure surface. The unit weight of both soils is 17 kN/m^3 . The angle of internal friction for both soils is equal to zero and the values for undrained shear strength, C_u , are 20 kN/m^2 and 35 kN/m^2 for soil (1) and soil (2), respectively.



Problem # 3

Using Taylor's slope stability charts, determine the factor of safety (with respect to strength) of an earth embankment (31 m high) which has a slope of 1 vertical and 2 horizontal. The properties of the soil are: $\gamma = 16 \text{ kN/m}^3$, $c = 25 \text{ kN/m}^2$, $\phi = 20^\circ$.

Problem # 4

The embankment shown below is made up from a soil with $c = 20 \text{ kN/m}^2$ and $\phi = 20^\circ$. The embankment sits on a soil with $c = 75 \text{ kN/m}^2$ and $\phi = 7^\circ$. For both soils, $\gamma = 19.3 \text{ kN/m}^3$.

Determine the factor of safety for the two slip circles shown in the figure:

- (a) Using Bishop method of slices for circle 1.
- (b) Using Fellenius method of slices for circle 2.

