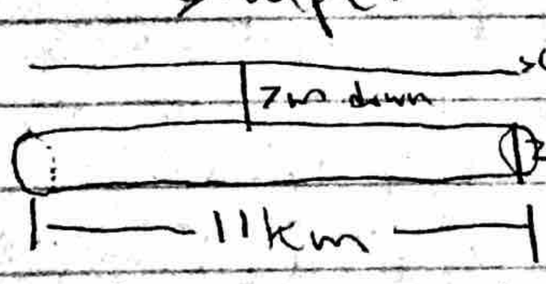
Module 4

- check tiki for codes to do module 4
- can ditch pi in some equations
- will need to convert lat-long to UTM

Task 1

- Using an initial background value of -155mGal to try and avoid nearby interference gave an excess mass of 3.16×10^{13} kg. Adjusting the background level to -170 mGal gave a value for excess mass of 2.10×10^{14} kg which is the almost the same value from Finn's paper.
- The code converts the data to utm, then produces a gravity map. to compute excess mass, It finds the difference between the recorded gravity and the gravity threshold then sums each of these to calculate excess mass.
- possible sources of difference are varying choices of threshold, as I chose a more conservative threshold for background gravity, as well as Finn's use of a regional gravity background that isn't constrained to a horizontal plane. Another source of error could be that it's hard to isolate the anomaly to a rectangular shape.

Task 2



Using a horizontal cylinder as the model, the plot shows a drop in gravity from around -0.2 to -0.9 towards the center of the tube. Readings would be spaced 10s of meters across the cave with spacing of hundreds of meters lengthwise.

Task 3

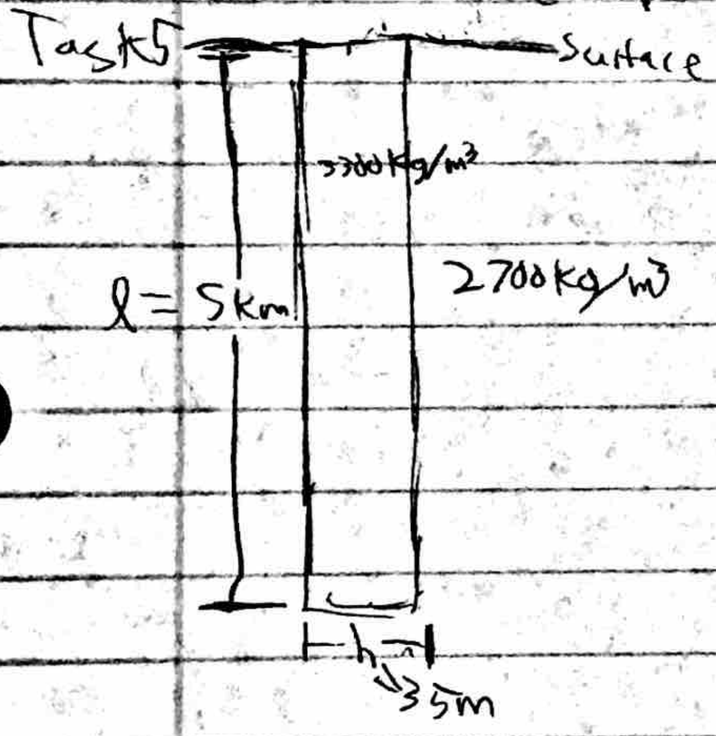
$g = 2\pi G \Delta\rho h$ Using infinite horizontal slab

so $g = 2\pi G(-720 kg m^{-3})(200 m) = -6.035$ mGal (draw it)

assuming density contrast $-720 kg m^{-3}$, constant 200 m thickness through entire basin. Resist accounting for plutons and variation of bed thickness

Task 4 This calculation is made assuming that the ocean has $\Delta\rho$ with continent of $-1700 kg\,m^3$ and a depth of 1km shown in the model. This is assuming a rectangular shape with finite parameters, and a depth from surface of 1m is used for the equation of a gravity anomaly due to a horizontal unit of finite extent. Compared to the Florida gravitymap, the calculated -7 mGal anomaly seen in the plot is a good comparison to the steep gravity drop from continental shelf to ocean.

Task 5



The feature is a vertical dike. A depth of 0m is used as an estimate of it being at the surface with a width of 35m and vertical extension of 5km. This gives an anomaly of around 1.8 mGal above the dike that falls off exponentially to around 0.14 mGal at 1km. This assumes a constant depth and thickness at depth for the dike as well as a constant $\Delta\rho$ of $600 kg\,m^3$ with its surrounding. The results indicate that a narrow spike in gravity may indicate the presence of a dike.