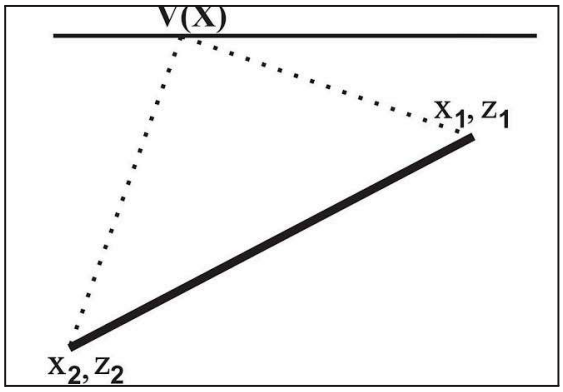
GS543 Tutorial 5: Numerical Differentiation

An inclined sheet-type structure (please refer the image) in two dimensions can be described by a set of five model parameters. x_1, z_1 and x_2, z_2 are the coordinates of the upper and lower end of the ore body.. The SP anomaly *V(x)* of a sheet-like body (Figure e) can also be given by the equation.

$$V(x) = kln\left[\frac{(x-x_1)^2+z_1^2}{(x-x_2)^2+z_2^2}\right]$$

$$V(x) = \mathrm{k}\ln\left[\frac{(x-x_1)^2+z_1^2}{(x-x_2)^2+z_2^2}\right] \quad (1)$$



The above equation 1 is used to calculate the response of Potential difference. The Potential Gradient 'G' can be computed numerically as

$$G\left(x_i + dx_i\right) = \frac{[V(x_{i+1})-V(x_i)]}{[x_{i+1}-x_i]} \quad . \qquad (2.1.5)$$

Write down a Python program to compute the SP anomaly and its Gradient for the following input and plot the curve as shown in the image.

xobs=0:10:1000;
x1=400;
z1=20;
x2=440;
z2=40;
k=100;