1. Give a clear, concise, and readable definition for each of the following:
   a. Unstable gravimeter
   b. Drift
   c. International Gravity Standardized Network 1971
   d. Nettleton’s method of gravity profiling

2. For the various geophysical methods listed below give the “operative (dependent)” physical property or properties each method is responding to:
   a) Gravity
   b) Magnetics
   c) Seismic refraction
   d) Seismic reflection
   e) Electrical resistivity
   f) Electromagnetics
3. What are the relative magnitudes of the terrain correction at gravity stations (a) at the top, (b) at the bottom, and (c) half-way up a vertical cliff 100m high?


<table>
<thead>
<tr>
<th>Station</th>
<th>Time</th>
<th>Dial Rdg. (du)</th>
<th>Elevation (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>0830</td>
<td>1049.2</td>
<td>198.48</td>
</tr>
<tr>
<td>SAB</td>
<td>0900</td>
<td>698.9</td>
<td>276.72</td>
</tr>
<tr>
<td>Base</td>
<td>0930</td>
<td>1046.2</td>
<td>198.48</td>
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<tr>
<td>DIL</td>
<td>1000</td>
<td>845.1</td>
<td>197.45</td>
</tr>
<tr>
<td>Base</td>
<td>1030</td>
<td>1049.2</td>
<td>198.48</td>
</tr>
</tbody>
</table>

Gravimeter scale constant = 0.872 gu/du
\( g_{th} \) @ base = 9,808,360.6 gu
\( g_{obs} \) @ base = 9,807,741.6 gu
Bouguer reduction density = 2.7 Mg/m³
Latitude of base = 47.4° N

a) What are the drift corrections for stations SAB and DIL with respect to the base reading at 0830?

b) What is the observed gravity at station SAB?
c) What is the difference in gravity between stations SAB and DIL due only to elevation?

d) If station SAB is 1056 m south of the base and station DIL is at the same latitude as the base, what is the difference in gravity just due to latitude. At which station is gravity greater due to this latitude effect.

e) What is the value of the simple Bouguer anomaly at the Base station?

f) If the horizontal and vertical uncertainty in the position of the base are 200 meters and 25 cm respectively, what is the maximum and minimum uncertainties in the calculated simple Bouguer anomaly value for the Base station?
5. The high-precision gravity profile shown below is over an empty lava tube (tunnel) on the Island of Hawaii. How far below surface is the top of the tunnel? Density of the volcanic rocks in the region is 3000 kg/m³. **Show the intermediate steps in solving this problem.**
6. Examine the Bouguer anomaly map shown below. Assume the regional variation is related to the thickness of the Earth's crust.

   a. Draw in the regional and then on the same figure draw in the residual using a 2.5 mgal contour interval. Neatness counts here.

   b. In what direction is the crust becoming thicker? Why?

   c. Which explanation of the local anomaly is most probable? Sediment of density 2.5 Mg/m$^3$ are intruded by (1) rock salt with density 2.2 Mg/m$^3$ or (2) granite with a density of 2.7Mg/m$^3$. 