IALP 2011 – Octave TP1

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MIEET 1º ano

Exercise 1:

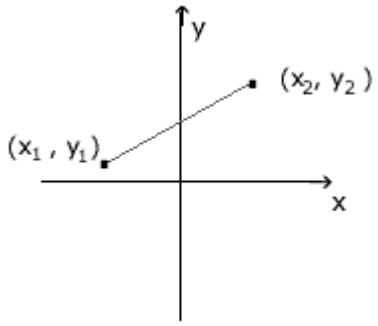
a) In the equation $ax^2 + bx + c$, find the roots with Octave if $a = 1$, $b = 3$ and $c = 1$.

b) What results do we get if we repeat with $b = 0$?

Exercise 2:

The distance between two points (x_1, y_1) and (x_2, y_2) in the Cartesian plane is given by

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



Calculate the distance between coordinates (5, 3) and (2, 5).

Exercise 3:

Do the above for both command line mode ('octave') and script mode ('QtOctave').

Exercise 4:

Calculate the size of Portugal based on Haversine formula[1]

Distance

This uses the '**haversine**' formula to calculate the great-circle distance between two points – that is, the shortest distance over the earth's surface – giving an 'as-the-crow-flies' distance between the points (ignoring any hills, of course!).

Haversine formula: $a = \sin^2(\Delta lat/2) + \cos(lat_1).\cos(lat_2).\sin^2(\Delta long/2)$

$c = 2.\text{atan2}(\sqrt{a}, \sqrt{(1-a)})$

$d = R.c$

where R is earth's radius (mean radius = 6,371km);
note that angles need to be in radians to pass to trig functions!

An example is given on the next page:

1 http://www.movable-type.co.uk/scripts/latlong.html

Enter the co-ordinates into the text boxes to try out the calculations. A variety of formats are accepted, principally:

deg-min-sec suffixed with N/S/E/W (e.g. 40°44′55″N, 73 59 11W), or

signed decimal degrees without compass direction, where negative indicates west/south (e.g. 40.7486, -73.9864):

Point 1: 41.966349N , -6.586647

Point 2: 36.992608N , -8.949051

Distance: [redacted] km

Initial bearing: **200°53′37″**

Final bearing: **199°23′24″**

Midpoint: **39°29′08″N, 007°48′36″W**

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