

Polynomials, Inequalities, and Factoring

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1 Introduction

Goals:

- Review/apply line equations
- Parallel lines
- Line intersections: systems of equations

2 Creating Tram Lines

For actual landmarks, look at Google Earth.

Landmark	Height	Distance (from last point)	X-coordinate
0	0	0	0.00
1	3269	0.82	0.82
2	4013	0.88	1.70
3	4726	0.75	2.45
4	5771	1.64	4.09
5	5481	0.95	5.04
6	5923	1.15	6.19
7	7194	1.01	7.20
8	7972	0.91	8.11

For a plot from point to point, see: [http://www.wolframalpha.com/input/?i=listplot+{\(0,0\),\(0.82,+3269\),\(1.70,+4013\),\(2.45,4726\),\(4.09,+5620\),\(5.04,5481\),\(6.19,+5923\),\(7.20,+7194\),\(8.11,+7972\)}](http://www.wolframalpha.com/input/?i=listplot+{(0,0),(0.82,+3269),(1.70,+4013),(2.45,4726),(4.09,+5620),(5.04,5481),(6.19,+5923),(7.20,+7194),(8.11,+7972)})

3 Poles and Parallel Lines

Trams have height. What would happen if we tried to hang a tram from the lines we constructed? Would we be able to reach the next point?

We need to raise the slope by a tens of feet so that the tram doesn't hit the edge of the next point.

But the height of the tram isn't always the same even if put equal length poles on both sides. How do we know, mathematically, that it won't hit the next cliff?

Parallel lines: if they are parallel, then if the tram doesn't touch the ground of the original cliff, it doesn't touch the ground of the next cliff.

4 Line Intersections

Now, there are times when we will have points between our poles that are either higher or high enough such that the tram will hit this point in between.

It's not just a point, either. See the cliffs between landmarks 3 and 4. It has a slope itself.

These points are:

(3.106, 5237), (3.434, 5555)

[http://www.wolframalpha.com/input/?i=listplot+{\(0,0\),\(0.82,+3269\), \(1.70,+4013\), \(2.45,4726\), +\(3.106,+5237\), +\(3.434,+5555\), +\(4.09,+5620\), +\(5.04,5481\), +\(6.19,+5923\), +\(7.20,+7194\), +\(8.11,+7972\)}](http://www.wolframalpha.com/input/?i=listplot+{(0,0),(0.82,+3269),(1.70,+4013),(2.45,4726),(3.106,+5237),(3.434,+5555),(4.09,+5620),(5.04,5481),(6.19,+5923),(7.20,+7194),(8.11,+7972)})

Clearly, we will need to raise the poles. But more importantly, how do we know mathematically whether the lines will intersect?

To know how to do this, we need to know more math: linear systems.