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You decide to climb Mount Marcy, which is New York State's highest peak. You park your car at the Adirondak Loj parking lot, hike up to the top of the mountain and then walk back down following the same trail.

Let $f(x)$ be your elevation in meters as a function of how many kilometers you have walked from the parking lot where you left your car.

1. Sketch this function knowing that the parking lot's elevation is 607m and that the peak is at 1,629m.

2. How is the tangent line at the point that represents the peak of the mountain (knowing that the top of this mountain is kind of "flat"). What assumption do we need to make to answer this question?

3. Is this true that all functions have a point with such a tangent line? Give the graphs of two examples and two counter-examples.

4. By looking at your examples, determine what conditions are necessary for such a point to exist.

5. Under these conditions, may we have several such points or do we have at most one?