Project 2

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Problem 1: Compute (by hand)

- The tangent direction[2] through the point $(x, p(x))$,
- The angle between (a) the perpendicular to the tangent plane through $(x, p(x))$ (the "normal axis") and (b) the line connecting (x_s, y_s) and $(x, p(x))$. Your answer can be in terms of the derivative of p or in terms of the coefficient a_i. This is the *angle of incidence*. Replacing (x_s, y_s) with (x_c, y_c) yields the *angle of reflection*.

Our tangent direction[2] through $(x, p(x))$ is given by

$$p'(x) = a_1 + 2a_2x + ... + na_nx^{n-1}$$

Following, our perpendicular to the tangent can be represented as

$$\perp = \arctan(\frac{1}{-p'(x)})$$

Furthermore, the line between (x_s, y_s) and $(x, p(x))$ can be represented as:

$$\arctan(\frac{p(x) - y_s}{x - x_s})$$

And thus,

$$Angle\ of\ incidence = |\arctan(\frac{1}{-p'(x)}) - \arctan(\frac{p(x) - y_s}{x - x_s})|$$