Problem Set M: Finding Tangents

This problem set concerns various techniques for constructing tangents.

1. The method of composition of motions was used to find tangents to such curves as ellipses, parabolas, hyperbolas, and cycloids. Let P and Q be the points $(1, 0)$ and $(-1, 0)$. Let X be any point, and define $f(X)$ to be the distance from X to P plus twice the distance from X to Q. Consider the curve $\mathcal{C}$ consisting of those points X for which $f(X) = \frac{13}{2}$. The point $Y = (1, \frac{3}{2})$ lies on $\mathcal{C}$. Use the method of composition of motions to find the slope of the tangent to $\mathcal{C}$ at Y.

2. Use Fermat's method for computing tangents (described on pp. 391–392) to find the equation of the tangent to the curve $x^3 + y^3 = 9$ at the point $(1, 2)$.

3. Use Barrow's method for computing tangents (pp. 395–396) to find the equation of the tangent to the curve $x^3 + y^3 = \frac{9}{2}xy$ at the point $(1, 2)$.

4. Use Newton's method of fluxions (see pp. 400–401) to find the equation of the tangent to the curve $x^4 + y^3 = 9$ at the point $(1, 2)$.