Mathematics 1350H – Linear algebra I: matrix algebra
Trent University, Summer 2015

Assignment #4
Due on Monday, 8 June, 2015.

Linear algebra for quadratic curves

Recall that the general equation of a circle of radius r centred at the point (p, q) is $(x-p)^2 + (y-q)^2 = r^2$, and that the general equation of a parabola with a vertical axis of symmetry is $y = ax^2 + bx + c$. Consider the three points $(5, -1)$, $(-2, 6)$, and $(1, -3)$.

1. Find the equation(s) of (all) the circle(s) which pass through the three given points. *[4]*

2. Find the equation(s) of (all) the parabola(s), if any, with a vertical axis of symmetry which pass through the three given points. *[4]*

3. In general, three points in a plane that are not all in a straight line determine a unique circle that passes through all three. Explain why this is so using what you know about linear algebra. *[2]*