

## MATH191: Practice Sheet 7

1. The equation  $x^2 - y^2 = 1$  describes a hyperbola. Calculate the slopes of the tangents to this hyperbola at  $(x, y) = (2, \sqrt{3})$  and at  $(x, y) = (2, -\sqrt{3})$ .

2. Consider the curve defined by

$$x^2y^2 + 2xy^3 - 3x + 2y = 2.$$

Find an expression for  $\frac{dy}{dx}$  in terms of  $x$  and  $y$ , and hence give the equation of the tangent to the curve at the point  $(x, y) = (1, 1)$ .

3. Find and classify the stationary points of the following functions  $f(x)$ . In each case, sketch the graph of the function, indicating any crossings of the axes. You may not be able to give zeros of the function exactly.

a)  $2x^3 - 9x^2 - 60x + 11$ ;      b)  $x^4 + 4x^3 + 4x^2 + 2$ ;      c)  $\ln(x) - x^2$ .

*Hint: In part c), what is the maximal domain of  $f(x)$ ?*

Not to be handed in