

### MCS21 Homework 32

1. Find the equation of the normal to the graph of  $y = x^3$  at the point  $x = \frac{1}{3}$ .
2. Find the equations of the tangent and the normal to the curve  $f(x) = x^3 - 3x^2$  at  $(1, -2)$ .
3. Find the equation of the normal to the curve  $x^2 + y^2 = 25$  at  $(3, -4)$ .
4. Find the equations of the lines that are tangent to and normal to the curve  $x^2y^2 = 9$  at  $(-1, 3)$ .

5. Find the equation of the line normal to the curve  $(y - x)^2 = 2x + 4$  at  $(6, 2)$ .
6. Find the equations of the lines normal to the curve  $xy + 2x - y = 0$  that are parallel to the line  $2x + y = 0$ .
7. The line that is normal to the curve  $y = x^2 + 2x - 3$  at  $(1, 0)$  intersects the curve at what other point?