1. Find the equation of the line which goes through the point (2,-1) and is perpendicular to the line given by the equation $2x - y = 1$.

2. a) Let $f(x) = x^2 + 3x - 1$. Find the slope of the line joining the points $(2,9)$ and $(x, f(x))$.
b) Find the slope of the tangent line to the curve $y = f(x)$ at the point $(2,9)$.
c) What is the equation of this tangent line?

3. Let $y = x^3 - 3x + 1$. Find the points on the curve whose tangent lines have slope $m = 9$.

4. Find the derivatives of the following functions:
a) $f(x) = x^3 - x^2 + 1$
b) $g(x) = x^2 + \dfrac{1}{x^3}$
c) $h(x) = (x^2 + \dfrac{1}{x^3})(x^3 - x^2 + 1)$

5. Find the derivatives of the given functions:
$f(x) = 3x^{-1} + x^3$
$g(x) = (x^3 + 1)^4$
$h(x) = (\cos(2x) + 1)\sin(3x)$

6. Find the derivative of $f(x) = \dfrac{x^2 + 1}{x + 1}$

7. Find the derivatives of the following functions: a) $f(x) = \cos^2 x$ b) $g(x) = \dfrac{\sin x}{\cos^2 x}$

8. Find the equation of the line tangent to the curve $y = \cos(x/2)$ at $(3\pi, 0)$

9. Let $f(x) = x^3 - 8x^2 + 3$. Find the interval in which $f'(x) < 0$.

10. An object moves in a straight line so that its position at time t is given by $x(t) = t(t^2 + 1)^2$. What is the velocity of the object when $t = 2$?

11. Let $f(x) = (x - \sqrt{x})^2$. Find $f'(x)$ and $f''(x)$.

12. Sketch the graph of a function with these properties:
a) $f(0) = 2$ and $f(1) = 0$;
b) $f'(x) < 0$ for $0 < x < 2$;
c) $f'(x) > 0$ for $x < 0$ or $x > 2$.