1. Given the function $f(x) = -\frac{1}{4}x^2 + 2$, find:

(a) (i) the tangent to $f(x)$ at $x = 2$ (3 marks)

(ii) the equation of the tangent line (2 marks)

(b) Given a second function, $g(x) = \frac{3}{4}(x+3)^2 + 1$, the tangent line from (a)(ii) intersects $g(x)$ at two points. Find the two points of intersection (4 marks)

Mark scheme:

(a) (i) $f'(x) = -\frac{1}{2}x$ (A1)

$f'(2) = -\frac{1}{2}x(2)$ (M1)

$f'(2) = -1$ (A1)

(ii) $y - 1 = -1(x - 2)$ or $y = -x + 3$ (A2) ft

(b) $(-1, 4)$ and $(-6.33, 9.33)$ (A2) ft (A2) ft
(Using a calculator or a form of systems of equations to solve)