

6. [Maximum mark: 16]

Consider the function $g(x) = x^3 + kx^2 - 15x + 5$.

(a) Find $g'(x)$. [3]

The tangent to the graph of $y = g(x)$ at $x = 2$ is parallel to the line $y = 21x + 7$.

(b) (i) Show that $k = 6$.

(ii) Find the equation of the tangent to the graph of $y = g(x)$ at $x = 2$. Give your answer in the form $y = mx + c$. [5]

(c) Use your answer to part (a) and the value of k to find the x -coordinates of the stationary points of the graph of $y = g(x)$. [3]

(d) (i) Find $g'(-1)$.

(ii) Hence justify that g is decreasing at $x = -1$. [3]

(e) Find the y -coordinate of the local minimum. [2]
