Question 4 **(25 marks)**

(a) Differentiate the function $2x^2 - 3x - 6$ with respect to x from first principles.

(b) Let $f(x) = \dfrac{2x}{x+2}$, $x \neq -2$, $x \in \mathbb{R}$. Find the co-ordinates of the points at which the slope of the tangent to the curve $y = f(x)$ is $\dfrac{1}{4}$.

Question 6 **(25 marks)**

(a) Let $f(x)=e^{-\frac{1}{2}x^2}$.

Show that the second derivative of $f(x)$ with respect to x is $f''(x)=\left(x^2-1\right)e^{-\frac{1}{2}x^2}$.

(b) The point P in the first quadrant is a point of inflection of the curve $y=e^{-\frac{1}{2}x^2}$.

Show that the tangent at P crosses the x-axis at $(2,0)$.