A particle moves in one dimension under the influence of a single conservative force given by

\[ F(x) = \alpha x^3 \]

where \( \alpha \) is a given constant. Take the potential energy reference to be at \( x_i = 0 \) such that:

\[ U(x_i) = 0 \]

and calculate the potential energy function \( U(x) \).

Multiple Choice:

(a) \( U(x) = \alpha x^3 \)
(b) \( U(x) = \alpha x^3 + U_0 \)
(c) \( U(x) = U_0 - \alpha x^3 \)
(d) \( U(x) = -\alpha x^4/4 \)
(e) \( U(x) = x_i - \alpha x^3/4 \)
(f) \( U(x) = x_i - 3\alpha x^2 \)
(g) None of the above

Answer: ____________________________