1 The elliptic curve $E : y^2 = x^3 + 1$.

(A) Verify that $P = (2, 3)$ is a point on $E$.

(B) Determine $2P$.

(C) Determine $3P$.

(D) Determine $4P, 5P, 6P, 7P, \ldots$.

(E) Find $Q$ so that $2Q = P$. 

The elliptic curve $E : y^2 = x^3 + 4x$.

(A) Verify that $P = (2, 4)$ is a point on $E$.

(B) Determine $2P$.

(C) Determine $3P, 4P, 5P, 6P, 7P, \ldots$.

(D) Find $Q$ so that $2Q = P$. 

3 The elliptic curve $E : y^2 = x^3 - 4x$.

(A) Verify that $P = (2, 0)$ and $Q = (0, 0)$ are points on $E$

(B) Determine $2P$

(C) Determine $2Q$

(D) Determine $P + Q$

(E) Find $R$ so that $2R = P$.

(F) Find $S$ so that $2S = Q$

(G) Find $T$ so that $2T = P + Q$
The elliptic curve $E : y^2 = x^3 - 1296x + 11664$.

(A) Verify that $P = (108, 0)$ is a point on $E$.

(B) Determine $2P$

(C) Determine $3P$

(D) Determine $4P, 5P, 6P, 7P$

(E) Find $Q$ so that $2Q = P$. 