Examples 2.6 – Integrals of Linear and Quadratic Functions

1. Find three quadratic functions that have \( x + 2 \) as a derivative, and sketch them on the same set of axes. Then find the family of antiderivatives \( \int (x + 2) \, dx \).

   **Solution:**

2. A projectile is fired upward from a 15.3 m cliff and allowed to fall into a valley below. The velocity of the projectile at time \( t \) is given by \( v(t) = -9.8t + 19.6 \) m/s. Find the displacement and total distance traveled on \([0, 3]\) using integration. Compare with Example 1.5.2(b).

   **Solution:** Displacement:

   ![Displacement Graph]

   Total Distance Traveled:

   ![Total Distance Graph]

3. If \( h'(t) = 4.2t \) is the rate of increase of the number of acres consumed by a forest fire per day, then what does \( \int_2^7 h'(t) \, dt \) represent, and what are its units? Calculate the integral.

   **Solution:**