6. [13 points] Jared, Katia and Rory run together frequently on their university’s track. The number of calories Jared, Katia and Rory each burn in running \( n \) laps is given by the functions \( J(n) \), \( K(n) \) and \( R(n) \) respectively. You may assume that all of these functions are invertible.

   a. [2 points] Jared always burns exactly as many calories as Katia does when he runs 5 more laps than she does. Write an expression for \( J(n) \) involving the function \( K \) that represents this fact.

   **Solution:** To burn the same number of calories as Jared does when he runs \( n \) laps, Katia needs to only run \( n - 5 \) laps. So we have \( J(n) = K(n - 5) \).

   \[
   J(n) = K(n - 5)
   \]

   b. [2 points] Rory has recently added a 10 minute bike ride to his workout routine, during which he burns an additional 150 calories. Let \( H(n) \) be the total number of calories that Rory burns (both running and biking) if he runs \( n \) laps and bikes for 10 minutes afterwards; write an expression for \( H(n) \) involving the function \( R \) that represents this fact.

   **Solution:** If Rory runs \( n \) laps and bikes for 10 minutes, he burns \( R(n) + 150 \) calories.

   \[
   H(n) = R(n) + 150
   \]

   c. [3 points] Interpret \( J^{-1}(100) \) in practical terms.

   **Solution:** \( J^{-1}(100) \) is the number of laps Jared must run to burn 100 calories.

   Like most people, Jared bases the length of his run on the average temperature forecast for that day: he decides to run \( G(m) \) laps when the projected average temperature is \( m \) (in degrees Fahrenheit).

   d. [3 points] Interpret \( J(G(90)) \) in practical terms.

   **Solution:** \( J(G(90)) \) is the number of calories Jared burns when the temperature is 90 degrees Fahrenheit.

   e. [3 points] The graph of the function \( y = G(m) \) has a vertical intercept. Interpret this vertical intercept in practical terms.

   **Solution:** The vertical intercept is the number of laps Jared runs when the temperature is 0 degrees Fahrenheit.