Problem 2.5

6. a. \( f(0) = 0, f(2) = 1, f(3) = 3, f(4) = 2 \)

   b. Domain: all \( x \) such that \( 0 \leq x \leq 4 \)

   c. Range: all \( y \) such that \( 0 \leq y \leq 3 \)

   d. \( f(x) = 0 \) for \( x = 0 \). So a real zero is 0.

10. \( y = 3 - 2x \)

    If \( y = 0 \), then \( 0 = 3 - 2x \), \( x = \frac{3}{2} \).

    If \( x = 0 \), then \( y = 3 \). Intercepts: \( \left( \frac{3}{2}, 0 \right), (0, 3) \)

    \( y \) is a function of \( x \). One-to-one.

    Domain: all real numbers

    Range: all real numbers

14. \( y = 4x^2 - 16 \)

    If \( y = 0 \), then \( 0 = 4x^2 - 16 = 4(x^2 - 4) \),
    \( 0 = 4(x+2)(x-2) \), \( x = \pm 2 \).

    If \( x = 0 \), then \( y = -16 \).

    Intercepts: \( (\pm 2, 0), (0, -16) \)

    \( y \) is a function of \( x \). Not one-to-one.

    Domain: all real numbers

    Range: all real numbers \( \geq -16 \)
30. \( F(r) = -\frac{1}{r} \)

If \( F(r) = 0 \), then \( 0 = -\frac{1}{r} \), which has no solution.

Because \( r \neq 0 \), there is no vertical-axis intercept. Intercept: none.

Domain: all real numbers \( \neq 0 \)
Range: all real numbers \( \neq 0 \)

32. \( v = H(t) = \left| u - 3 \right| \)

If \( v = 0 \), then \( 0 = \left| u - 3 \right| \), \( u - 3 = 0 \), so \( u = 3 \).

If \( u = 0 \), then \( v = -3 \).

Intercepts: \((3, 0), (0, 3)\).

Domain: all real numbers
Range: all real numbers \( \geq 0 \)

36. Domain: all real numbers \( \geq -1 \)
Range: all real numbers \( \leq 11 \)

40. From the horizontal line test, the graphs which represent one-to-one functions of \( x \) are (c) and (d).