**Chapter 1: Introduction to Linear Functions**

**Question 1:**
Consider the linear function f(x)=4x−7f(x) = 4x - 7f(x)=4x−7.
a) What is the slope of the line?
b) What is the y-intercept of the line?
c) Plot the graph of this function.

**Question 2:**
Determine whether the following functions are linear:
a) y=−3x+5y = -3x + 5y=−3x+5
b) y=2x2+4y = 2x^2 + 4y=2x2+4
c) y=12x−8y = \frac{1}{2}x - 8y=21​x−8
d) y=x(x−3)y = x(x - 3)y=x(x−3)

**Question 3:**
Write the equation of a line with the following characteristics:
a) A slope of 3 and passes through the point (0, -2).
b) A y-intercept of 7 and passes through the point (2, 1).

**Chapter 2: Introduction to Quadratic Functions**

**Question 4:**
Given the quadratic function g(x)=2x2−4x+1g(x) = 2x^2 - 4x + 1g(x)=2x2−4x+1:
a) Identify the coefficients aaa, bbb, and ccc.
b) Find the vertex of the parabola.
c) Determine whether the parabola opens upwards or downwards.
d) Calculate the axis of symmetry.

**Question 5:**
Sketch the graph of the quadratic function f(x)=−x2+6x−8f(x) = -x^2 + 6x - 8f(x)=−x2+6x−8 and identify:
a) The vertex
b) The axis of symmetry
c) The direction in which the parabola opens
d) The y-intercept

**Question 6:**
Solve the quadratic equation x2−5x+6=0x^2 - 5x + 6 = 0x2−5x+6=0 by factoring, and identify the points where the graph intersects the x-axis.

**Chapter 3: Comparing Linear and Quadratic Functions**

**Question 7:**
Consider the linear function f(x)=2x+3f(x) = 2x + 3f(x)=2x+3 and the quadratic function g(x)=x2−4x+3g(x) = x^2 - 4x + 3g(x)=x2−4x+3.
a) Plot the graphs of both functions on the same set of axes.
b) Describe how the shapes of the graphs differ.
c) Find the points of intersection between the two graphs.

**Question 8:**
Explain the key differences between the slopes of linear and quadratic functions. How does the slope of a quadratic function change with respect to xxx?

**Question 9:**
Identify whether each of the following scenarios can be modeled by a linear or quadratic function:
a) The cost of producing xxx items, where each item costs $10, with a fixed overhead cost of $50.
b) The height of a ball over time when thrown into the air.
c) The distance traveled by a car moving at a constant speed.
d) The area of a square as the length of its side changes.

**Chapter 4: Real-World Applications**

**Question 10:**
Create your own real-world scenario that can be modeled by a linear function. Write the function and explain how it applies to your scenario. Then, do the same for a quadratic function, explaining the real-world situation it represents.

**Answer Key**

**Question 1:**
a) Slope m=4m = 4m=4
b) Y-intercept b=−7b = -7b=−7
c) The graph is a straight line passing through points such as (0, -7) and (1, -3).

**Question 2:**
a) Linear
b) Not linear (quadratic)
c) Linear
d) Not linear (quadratic)

**Question 3:**
a) Equation: y=3x−2y = 3x - 2y=3x−2
b) Equation: y=−3x+7y = -3x + 7y=−3x+7

**Question 4:**
a) a=2a = 2a=2, b=−4b = -4b=−4, c=1c = 1c=1
b) Vertex at (1,−1)(1, -1)(1,−1)
c) Parabola opens upwards
d) Axis of symmetry x=1x = 1x=1

**Question 5:**
a) Vertex at (3,1)(3, 1)(3,1)
b) Axis of symmetry x=3x = 3x=3
c) Parabola opens downwards
d) Y-intercept at y=−8y = -8y=−8

**Question 6:**
The quadratic equation factors as (x−2)(x−3)=0(x - 2)(x - 3) = 0(x−2)(x−3)=0. The solutions are x=2x = 2x=2 and x=3x = 3x=3, so the graph intersects the x-axis at these points.

**Question 7:**
a) The linear graph is a straight line, and the quadratic graph is a parabola opening upwards.
b) The linear graph has a constant slope, while the quadratic graph curves.
c) Points of intersection: Solve 2x+3=x2−4x+32x + 3 = x^2 - 4x + 32x+3=x2−4x+3.

**Question 8:**
The slope of a linear function is constant. The slope of a quadratic function changes with respect to xxx and is not constant. The quadratic function's slope depends on the first derivative 2ax+b2ax + b2ax+b.

**Question 9:**
a) Linear
b) Quadratic
c) Linear
d) Quadratic

**Question 10:**
(Answers will vary based on the scenario provided by the student. Ensure the scenarios correctly reflect the nature of linear and quadratic functions.)