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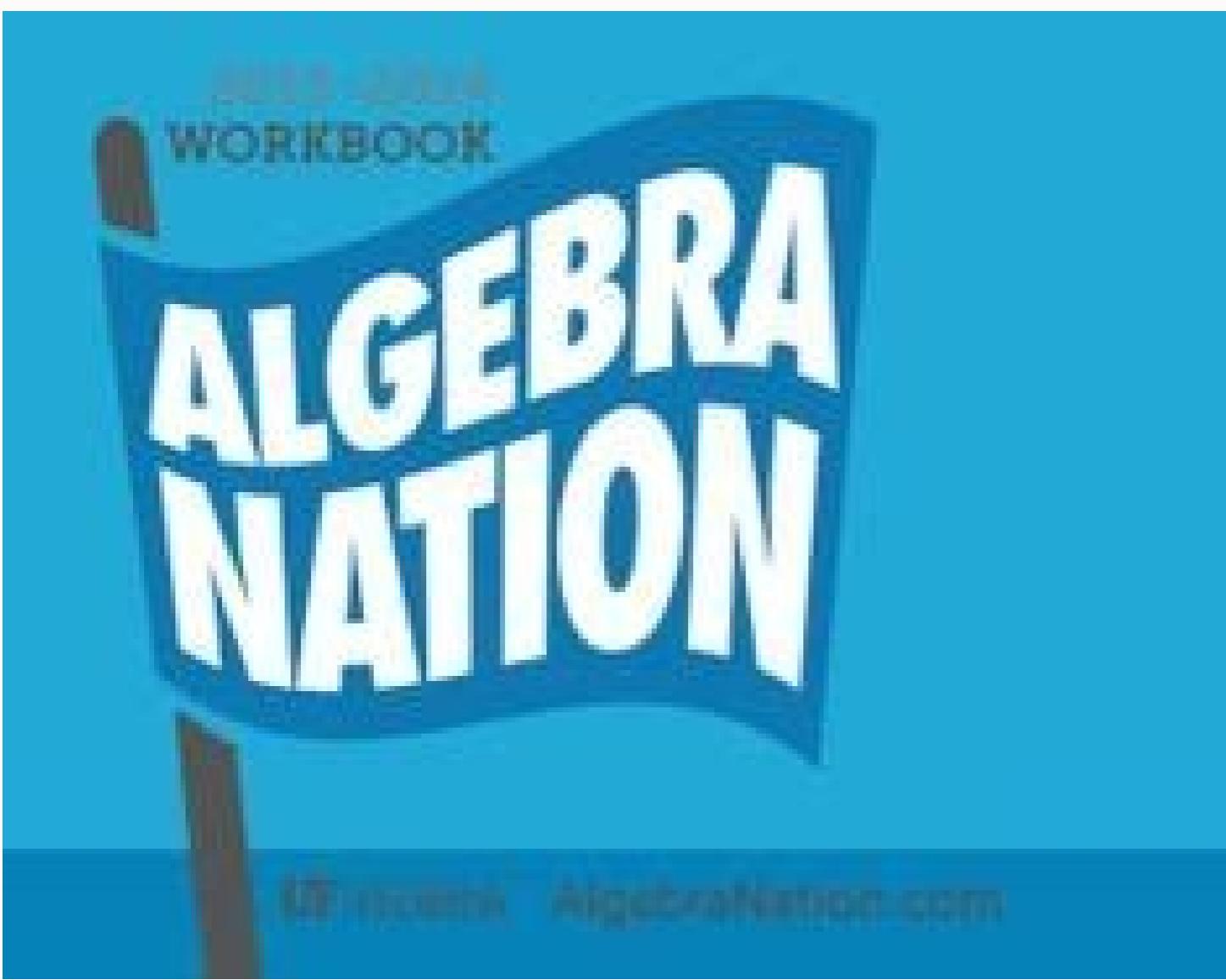
$x_1 - x_2 - 2x_3 - x_4 = -3$

(b) $3x_1 - 7x_2 + 4x_3 = 10$
 $x_1 - 2x_2 + x_3 = 3$
 $2x_1 - x_2 - 2x_3 = 6$

(c) $x_1 + 2x_2 - x_3 + x_4 = 5$
 $x_1 + 4x_2 - 3x_3 - 3x_4 = 6$
 $2x_1 + 3x_2 - x_3 + 4x_4 = 8$

(d) $x_1 + 2x_2 + 2x_3 = 2$
 $x_1 + 8x_3 + 5x_4 = -6$
 $x_1 + x_2 + 5x_3 + 5x_4 = 3$

(e) $x_1 + 2x_2 - 4x_3 - x_4 + x_5 = 7$
 $-x_1 + 10x_3 - 3x_4 - 4x_5 = -16$
 $2x_1 + 5x_2 - 5x_3 - 4x_4 - x_5 = 2$



APSC Assistant Engineer Answer Key 2021



ASSAM PUBLIC SERVICE COMMISSION
(APSC)

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Section 3.2 Introduction to Polynomial Functions 303

EXAMPLE 1 | Determining End Behavior

Use the leading term to determine the end behavior of the graph of the function.

a. $f(x) = -4x^3 + 6x^2 + 2x$ b. $g(x) = \frac{1}{4}x(2x - 3)(x + 4)^2$

Solution:

a. $f(x) = -4x^3 + 6x^2 + 2x$ negative $\boxed{\text{odd}}$

The leading coefficient is negative and the degree is odd. By the leading term test, the function goes up to the left and down to the right. This is similar to the graph of $y = x^3$ reflected across the x -axis.

As $x \rightarrow -\infty$, $f(x) \rightarrow \infty$.
As $x \rightarrow \infty$, $f(x) \rightarrow -\infty$.

b. $g(x) = \frac{1}{4}x(2x - 3)(x + 4)^2$ positive $\boxed{\text{even}}$

To determine the leading term, multiply the leading terms from each factor. That is,

$$g(x) = \frac{1}{4}x(2x - 3)(x + 4)^2 = 2x^4 + \dots$$

The leading coefficient is positive and the degree is even. By the leading term test, the end behavior is up to the left and up to the right.

As $x \rightarrow -\infty$, $f(x) \rightarrow \infty$.
As $x \rightarrow \infty$, $f(x) \rightarrow \infty$.

Skill Practice 1 Use the leading term to determine the end behavior of the graph of the function.

a. $f(x) = -0.3x^4 - 5x^2 - 3x + 4$ b. $g(x) = \frac{6}{7}(x - 9)^2(x + 4)^2(3x - 5)$

2. Identify Zeros and Multiplicities of Zeros

Consider a polynomial function defined by $y = f(x)$. The values of x in the domain of f for which $f(x) = 0$ are called the **zeros** of the function. These are the real solutions (or roots) of the equation $f(x) = 0$ and correspond to the x -intercepts of the graph of $y = f(x)$.

Answers

1. a. Down to the left, up to the right.
As $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$.
As $x \rightarrow \infty$, $f(x) \rightarrow \infty$.

b. Down to the left, up to the right.
As $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$.
As $x \rightarrow \infty$, $f(x) \rightarrow \infty$.



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