Section 2.1 Major Concept Answers

1. a. 3  
   b. linear  
   c. -13  
   d. (0, 4)  
   e. polynomial  
   f. less  
2. a. \( a > 0 \)  
   b. \( (h, k) \)  
   c. \( \left( \frac{b}{2a}, c - \frac{b^2}{4a} \right) \)  
   d. \( x = -\frac{b}{2a} \)
3. a. becomes narrower  
   b. moves left, moves downward (in either order)  
   c. moves right, moves downward (in either order)

Section 2.3 Major Concept Answers

<table>
<thead>
<tr>
<th>Degree of ( f(x) )</th>
<th>Sign of leading coefficient</th>
<th>( f(x) \to ) as ( x \to \infty )</th>
<th>( f(x) \to ) as ( x \to -\infty )</th>
<th>Maximum number of real zeros</th>
<th>Maximum number of local minimums</th>
<th>Maximum number of local maximums</th>
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</thead>
<tbody>
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<td>1</td>
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<td>( \infty )</td>
<td>( -\infty )</td>
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<tr>
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<td>( \infty )</td>
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<tr>
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<td>-</td>
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<td>8</td>
<td>4</td>
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</tr>
</tbody>
</table>

Section 2.4 Major Concept Answers

1. greater than or equal to; quotient; remainder; \( d(x); r(x); 0; d \)
2. No, Julian should have used a 0 to represent the missing \( x^3 \)-term.
3. 1; 1
4. Divide both expressions by 2:
   \[ \frac{1.5x^4 - x^3 + 0.5x^2 - x + 2.5}{x + 1.5} \]
5. \( x - 15 \)
6. \( x + 3 \)
7. The remainder must be 0 (a constant) or a polynomial whose degree is less than the degree of \( (x - c) \), and a degree 0 polynomial is a constant.

Section 2.5 Major Concept Answers

1. 99
2. 5
3. \( 4 + 2i; x^2 - 8x + 20 \)
4. 8
5. 6
6. odd; even
7. \( ax^2 + bx + c \) is irreducible over the reals if \( b^2 - 4ac < 0 \).
8. No, because the number of nonreal complex zeros must be even and the total number of zeros must be odd.
9. Yes, it must have an even number of real number zeros because the number of nonreal complex zeros must be even and the total number of zeros must be even.