

**Algebra 2 TEST 4.2 Review**

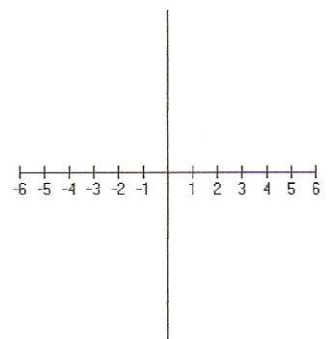
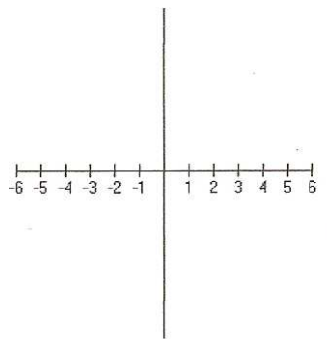
Name: \_\_\_\_\_

**Do Sections I, III, IV, V, VIII, and IX on your OWN PAPER.**

I. Solve each of the polynomial equations by factoring to start...

1. $3x^3 = 13x^2 - 4x$	2. $x^4 + 4x^2 - 45 = 0$	3. $3x^3 + x^2 = 48x + 16$
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II. Graph a sketch of the polynomial function and find the requested information WITHOUT using a graphing calculator.

<p>4. <math>y = (x+3)^3(x+1)^2(x-3)</math></p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Root(s)</th> <th>Multiplicity</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table> <p>Degree of the Polynomial: _____</p>	Root(s)	Multiplicity							<p>5. <math>f(x) = -x(x+2)^3(2x-5)</math></p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Root(s)</th> <th>Multiplicity</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table> <p>Degree of the Polynomial: _____</p>	Root(s)	Multiplicity						
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III. Write the simplest polynomial function,  $P(x)$ , with the given zeros.

6. -3, 2, and 4	7. 4 and 9i	8. -5 and $-\sqrt{2}$
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IV. List all the possible rational roots of the following equations.

9. $x^3 - x^2 + 4x - 4 = 0$	10. $4x^4 - x^2 + 1 = 0$	11. $3x^5 + 12x^2 - 12 = 0$
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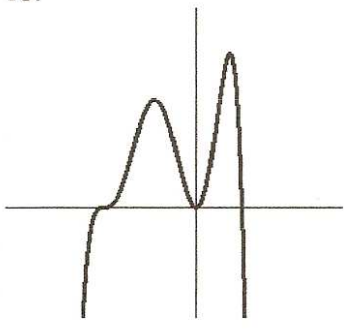
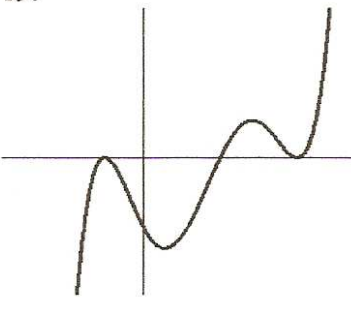
V. Use the rational roots theorem to solve the following equations. You may use your calculator to narrow down your search. ☺ Give the roots as EXACT VALUES.

12. $11x^3 - 19x^2 - 171x - 45 = 0$	13. $x^4 - 2x^3 + 6x = 6x^2 - 9$	14. $x^4 - 3x^3 + 32x^2 = 108x + 144$
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VI. Find the requested information for each polynomial graph. All polynomials are in standard form.

<p>15. <math>P(x) = -6x^5 - x^3 + \dots + x - 2</math></p> <p>Leading Coefficient: _____</p> <p>Degree: _____</p> <p>End Behavior:  <math>x \rightarrow -\infty, y \rightarrow</math> _____  <math>x \rightarrow +\infty, y \rightarrow</math> _____</p>	<p>16. <math>P(x) = -2x^6 + x^5 + \dots + 3x + 12</math></p> <p>Leading Coefficient: _____</p> <p>Degree: _____</p> <p>End Behavior:  <math>x \rightarrow -\infty, y \rightarrow</math> _____  <math>x \rightarrow +\infty, y \rightarrow</math> _____</p>	<p>17. <math>P(x) = x^7 - 4x^6 + \dots + x + 4</math></p> <p>Leading Coefficient: _____</p> <p>Degree: _____</p> <p>End Behavior:  <math>x \rightarrow -\infty, y \rightarrow</math> _____  <math>x \rightarrow +\infty, y \rightarrow</math> _____</p>
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VII. Identify whether the following graphed functions have an odd or even degree and also whether they have a positive negative leading coefficient.

<p>18.</p>  <div style="border: 1px solid black; padding: 5px; margin-top: 10px; width: fit-content;"> <p>Odd or Even?</p> <p>+ or - Leading Coefficient?</p> </div>	<p>19.</p>  <div style="border: 1px solid black; padding: 5px; margin-top: 10px; width: fit-content;"> <p>Odd or Even?</p> <p>+ or - Leading Coefficient?</p> </div>
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VIII. Use finite differences to determine the degree of the polynomial that best describes the data.

<p>20.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr><td>y</td><td>-16</td><td>-14</td><td>-6</td><td>8</td><td>28</td><td>54</td></tr> </table>	x	-2	-1	0	1	2	3	y	-16	-14	-6	8	28	54	<p>21.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr><td>y</td><td>76</td><td>19</td><td>12</td><td>7</td><td>-20</td><td>-69</td></tr> </table>	x	-2	-1	0	1	2	3	y	76	19	12	7	-20	-69	<p>22.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr><td>y</td><td>1</td><td>-3</td><td>-1</td><td>1</td><td>21</td><td>101</td></tr> </table>	x	-2	-1	0	1	2	3	y	1	-3	-1	1	21	101
x	-2	-1	0	1	2	3																																						
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IX. Word Problem.

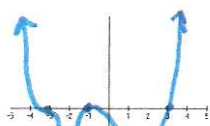
23. The table below show the profit for a company in thousands of dollars for the years shown. Let  $x$  represent the number of years since 1999. Write a polynomial function for the data, rounding to two decimal places when necessary. Then use your **EXACT** equation to predict the profits for the year 2012.

Year	1999	2000	2001	2002	2003
Profits (thousands of \$)	\$286	\$401	\$507	\$671	\$960

**Answers:**

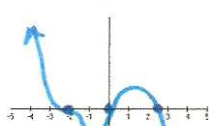
1.  $x = 0, 1, \frac{4}{3}$     2.  $x = \pm\sqrt{5}, \pm 3i$     3.  $x = -\frac{1}{3}, \pm 4$     #4-5 below
6.  $P(x) = x^3 - 3x^2 - 10x + 24$     7.  $P(x) = x^3 - 4x^2 + 81x - 324$     8.  $P(x) = x^3 + 5x^2 - 2x - 10$
9.  $\frac{P}{q}: \pm 1, \pm 2, \pm 4$     10.  $\frac{P}{q}: \pm 1, \pm \frac{1}{2}, \pm \frac{1}{4}$     11.  $\frac{P}{q}: \pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{4}{3}$
12.  $x = -3, 5, -\frac{3}{11}$     13.  $x = -1, -3, \pm\sqrt{3}$     14.  $x = -1, 4, \pm 6i$     #15-17 see below
18. even, negative    19. odd, positive    20. quadratic    21. quartic    22. cubic
23.  $y \approx 11.17x^3 - 38x^2 + 141.83x + 286; \approx \$20,241,000$

4. 6<sup>th</sup> degree



-3 w/ mult. 3  
-1 w/ mult. 2  
3 w/ mult. 1

5. 5<sup>th</sup> degree



0 w/ mult. 1  
-2 w/ mult. 3  
2.5 w/ mult. 1

15.

Leading Coefficient: -6  
Degree: 5  
End Behavior:  
 $x \rightarrow -\infty, y \rightarrow +\infty$   
 $x \rightarrow +\infty, y \rightarrow -\infty$

16.

Leading Coefficient: -2  
Degree: 6  
End Behavior:  
 $x \rightarrow -\infty, y \rightarrow -\infty$   
 $x \rightarrow +\infty, y \rightarrow -\infty$

17.

Leading Coefficient: 1  
Degree: 7  
End Behavior:  
 $x \rightarrow -\infty, y \rightarrow -\infty$   
 $x \rightarrow +\infty, y \rightarrow +\infty$