

## Chapter 14 answers

### 14.1

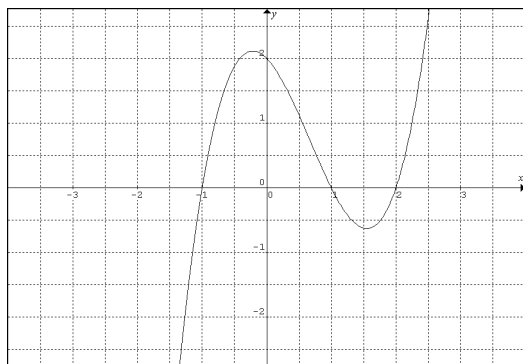
1. Yes                      3. No                      5. Yes                      7. No                      9. Yes
11. 2 multiplicity 1, -1 multiplicity 1      13. 3 multiplicity 1, -4 multiplicity 2      15. 1 multiplicity 3, -2 multiplicity 2
17.  $-7/3$  multiplicity 3, -3 multiplicity 3      19. 0 multiplicity 3,  $1/6$  multiplicity 2, 4 multiplicity 4
21.  $-1/2$  multiplicity 2                      23. 0 multiplicity 2, -1 multiplicity 2                      25. 2 multiplicity 2, -2 multiplicity 1
27.  $\{2, 1, -1\}$                       29.  $\{3, 1, -2\}$                       31.  $\{1, -1 \pm \sqrt{6}\}$                       33.  $\{3, 1, -\frac{2}{3}\}$                       35.  $\{\frac{1}{3}, 1 \pm i\}$
37.  $\{2, -1, \frac{1}{3}, -\frac{1}{3}\}$                       39.  $\{5, 0\}$                       41.  $\{3, -4\}$                       43.  $\{4, -\frac{1}{3}, \frac{-1 \pm \sqrt{17}}{4}\}$
45.  $\{-\frac{2}{3}, \frac{1}{2}, \frac{3 \pm i\sqrt{11}}{2}\}$                       47.  $\{-2, 1, 3, \pm\sqrt{6}\}$                       49.  $\{-2, 2, \frac{1}{2}, \pm i\}$

### 14.2

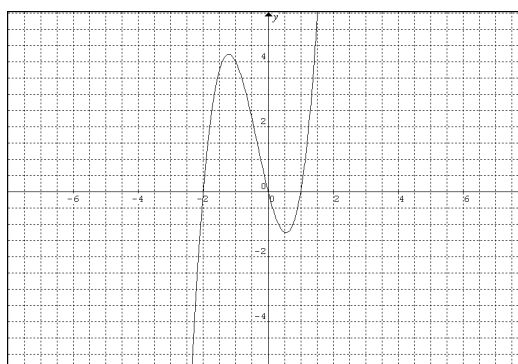
1.  $\pm 1, \pm 2, \pm 3, \pm 6$                       3.  $\pm 1, \pm 3, \pm \frac{1}{2}, \pm \frac{3}{2}$                       5.  $\pm 1, \pm \frac{1}{2}, \pm \frac{1}{4}$                       7.  $\pm 1, \pm \frac{1}{2}, \pm 5, \pm \frac{5}{2}, \pm 25, \pm \frac{25}{2}$
9.  $\pm 1, \pm \frac{1}{3}, \pm 2, \pm \frac{2}{3}, \pm 3, \pm 6, \pm 9, \pm 18$                       11.  $\pm 1, \pm \frac{1}{3}, \pm \frac{1}{9}, \pm 2, \pm \frac{2}{3}, \pm \frac{2}{9}, \pm 3, \pm 4, \pm \frac{4}{3}, \pm \frac{4}{9}, \pm 6, \pm 12$
13.  $\{1, -3, \frac{1}{2}\}$                       15.  $\{\frac{1}{2}, \pm i\sqrt{3}\}$                       17.  $\{2, -1, \pm\sqrt{3}\}$                       19.  $\{0, 3, \frac{-1 \pm i\sqrt{3}}{2}\}$
21.  $\{1 \pm i\sqrt{2}, \pm\sqrt{7}\}$                       23.  $\{2 \pm i, \pm 3i\}$                       25.  $\{1, \pm 2\sqrt{2}, \pm i\}$                       27.  $\{1 \pm \sqrt{2}, 1, -1\}$
29.  $\{\pm 2i, 1, -2\}$                       31.  $f(x) = x^3 - 4x^2 + 2x + 4$                       33.  $f(x) = 3x^4 + 11x^3 - 22x^2 - 66x + 24$
35.  $f(x) = 3x^4 - x^3 - 20x^2 - 24x - 8$                       37.  $f(x) = 2x^5 - 21x^4 + 72x^3 - 87x^2 + 28x$
39.  $f(x) = x^6 + 14x^4 + 49x^2 + 36$

### 14.3

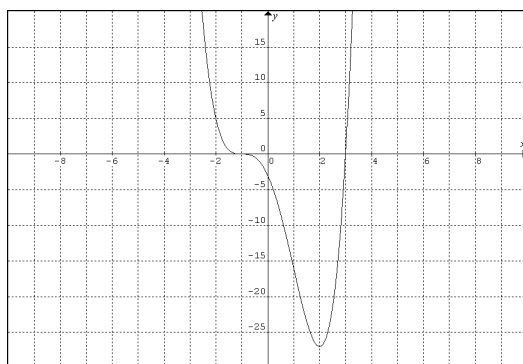
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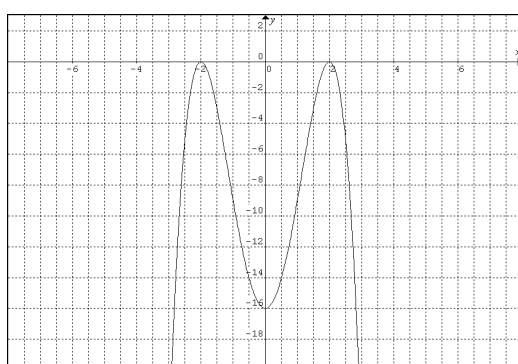
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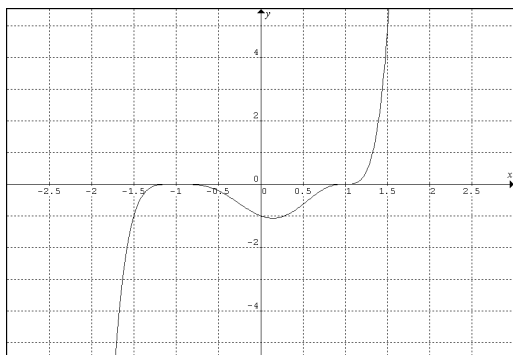
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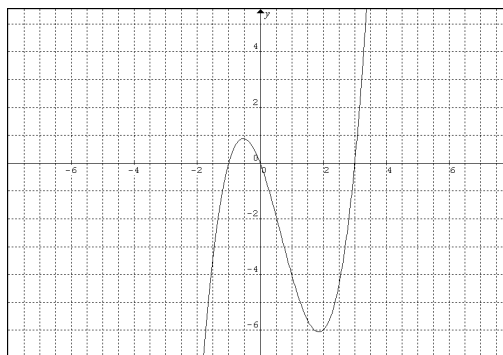
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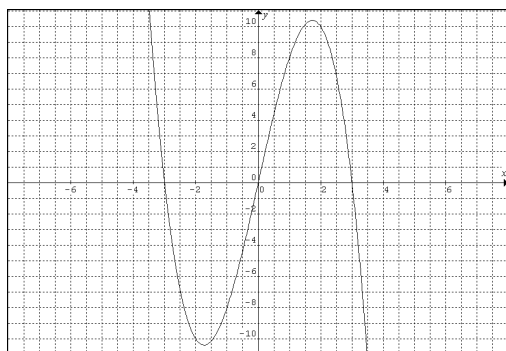
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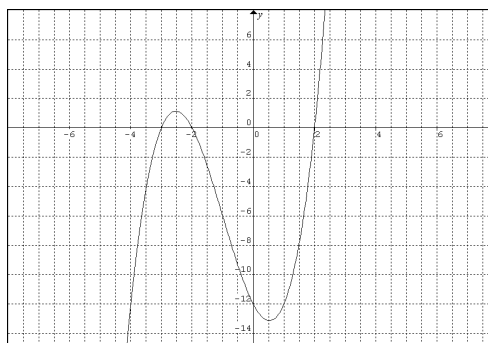
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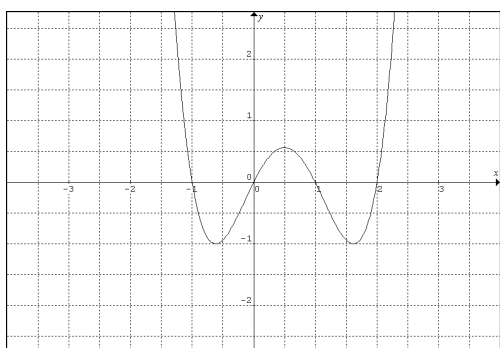
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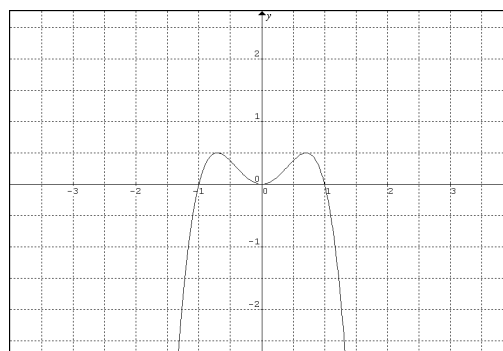
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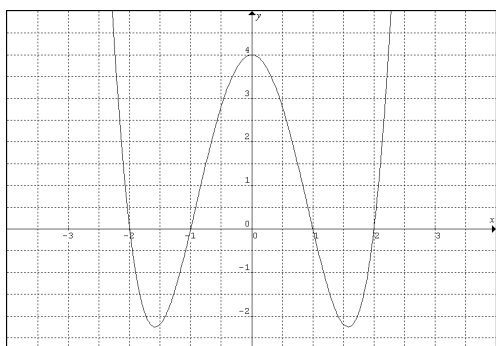
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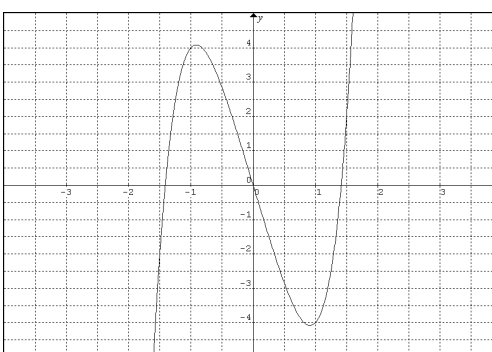
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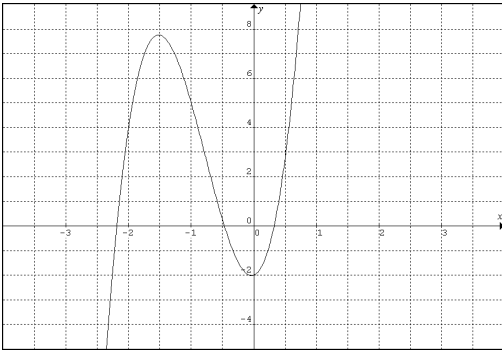
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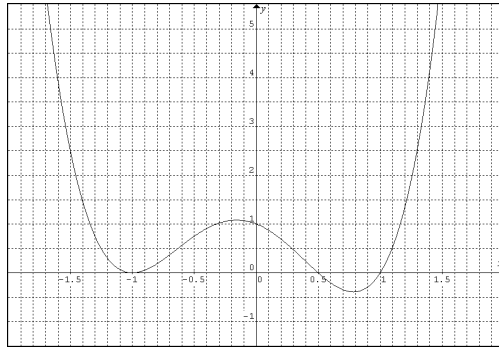
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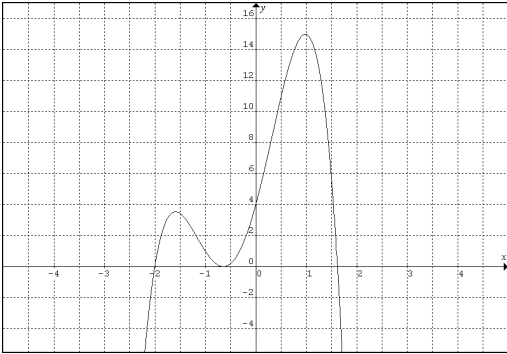
25.



27.

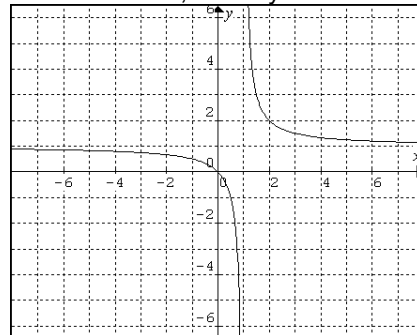
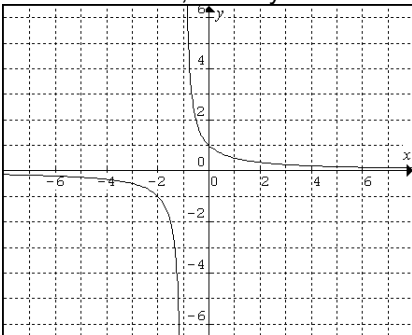


29.

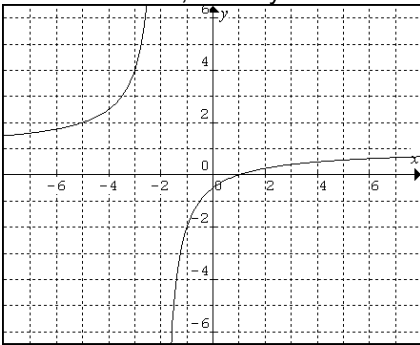


### 14.4

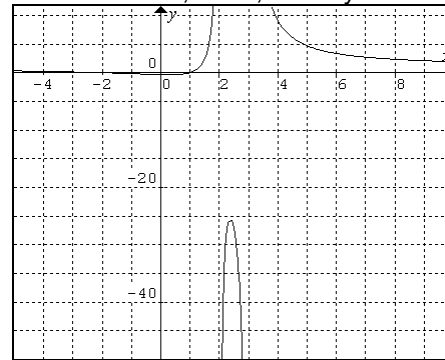
- |  |  |
|--|--|
| 1. vertical: $x = 1$ , horizontal: $y = 6$                   | 3. vertical: $x = 1/3$ , horizontal: $y = 2/3$           |
| 5. vertical: $x = -1$ , $x = 2$ , horizontal: $y = 0$        | 7. vertical: $x = 4$ , $x = -2$ , horizontal: $y = 0$    |
| 9. vertical: $x = -3/2$ , $x = 4$ , horizontal: none         | 11. vertical: $x = 0$ , $x = 2$ , horizontal: none       |
| 13. vertical: $x = -1$ , $x = 1$ , horizontal: $y = 0$       | 15. vertical: $x = -1$ , $x = 0$ , horizontal: none      |
| 17. x-int: none, y-int: $-2/3$                               | 19. x-int: 1, y-int: -1                                  |
| 23. x-int: -2, 2, y-int: $4/5$                               | 25. x-int: 0, y-int: 0                                   |
| 29. x-int: 0, -2, 10, y-int: 0                               | 27. x-int: -5, 5, -2, 2, y-int: none                     |
| 31. x-int: none, y-int: 1<br>vert: $x = -1$ , horiz: $y = 0$ | 33. x-int: 0, y-int: 0<br>vert: $x = 1$ , horiz: $y = 1$ |



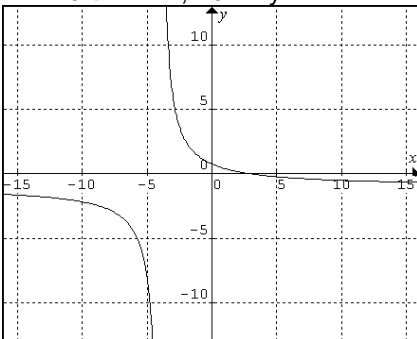
35. x-int: 1, y-int: -1/2  
vert:  $x = -2$ , horiz:  $y = 1$



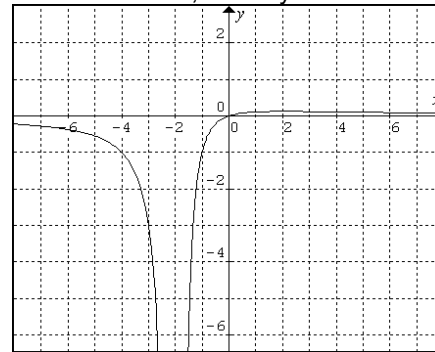
43. x-int: 1, -2, y-int: -1/3  
vert:  $x = 2$ ,  $x = 3$ , horiz:  $y = 1$



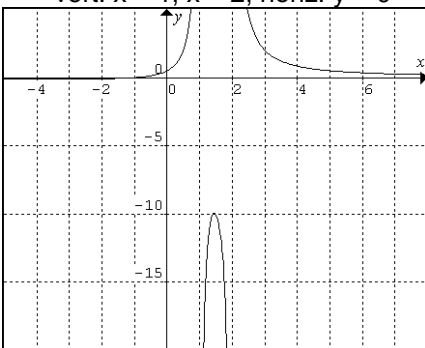
37. x-int: 3, y-int: 3/4  
vert:  $x = -4$ , horiz:  $y = -1$



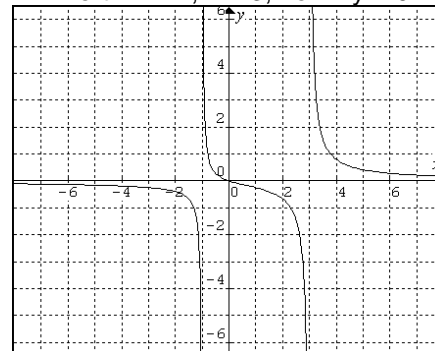
45. x-int: 0, y-int: 0  
vert:  $x = -2$ , horiz:  $y = 0$



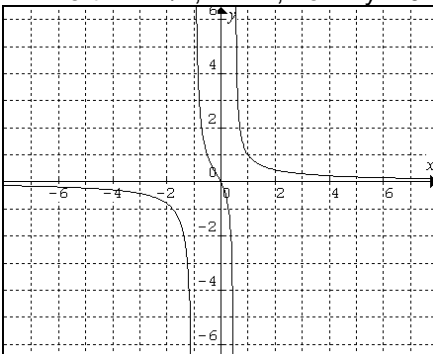
39. x-int: -1, y-int: 1/2  
vert:  $x = 1$ ,  $x = 2$ , horiz:  $y = 0$



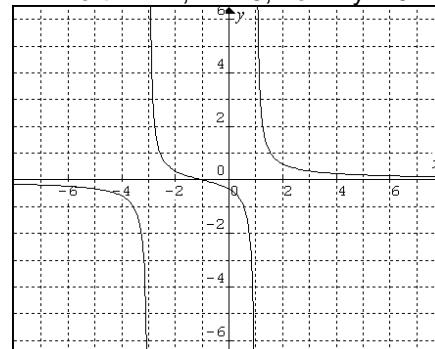
47. x-int: 0, y-int: 0  
vert:  $x = -1$ ,  $x = 3$ , horiz:  $y = 0$



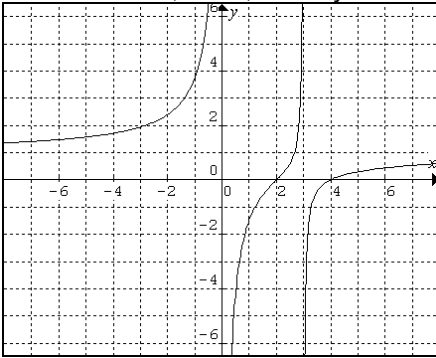
41. x-int: 0, y-int: 0  
vert:  $x = 1/2$ ,  $x = -1$ , horiz:  $y = 0$



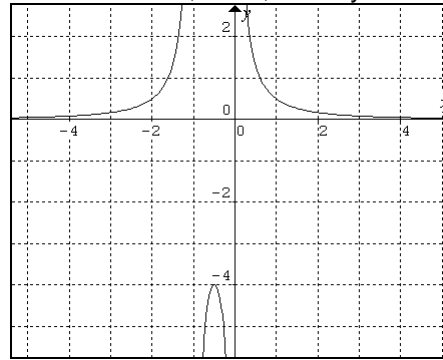
49. x-int: -1, y-int: -1/3  
vert:  $x = 1$ ,  $x = -3$ , horiz:  $y = 0$



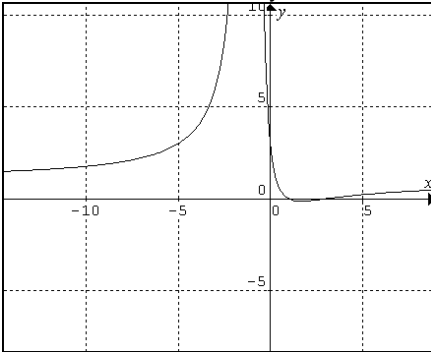
51. x-int: 2, 4, y-int: none  
 vert:  $x = 0$ ,  $x = 3$ , horiz:  $y = 1$



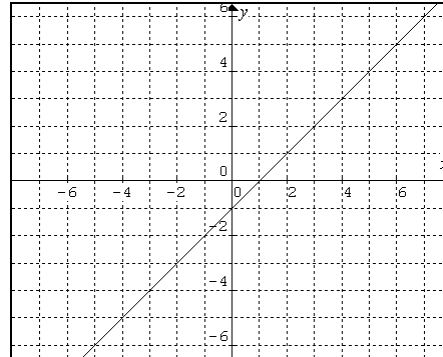
59. x-int: none, y-int: none  
 vert:  $x = -1$ ,  $x = 0$ , horiz:  $y = 0$



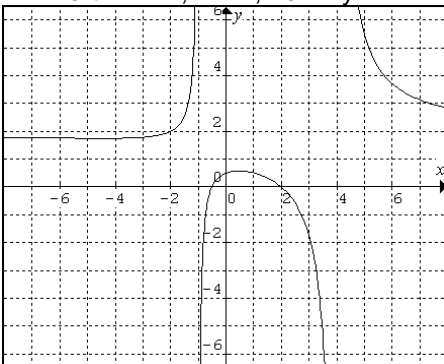
53. x-int: 3, 1, y-int: 2  
 vert:  $x = -1$ , horiz:  $y = 1$



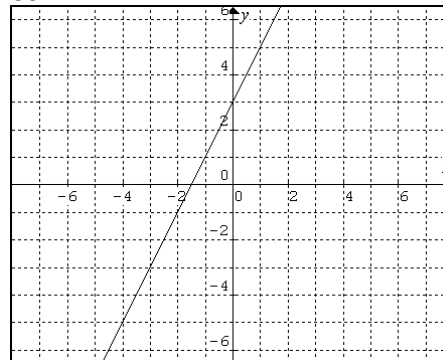
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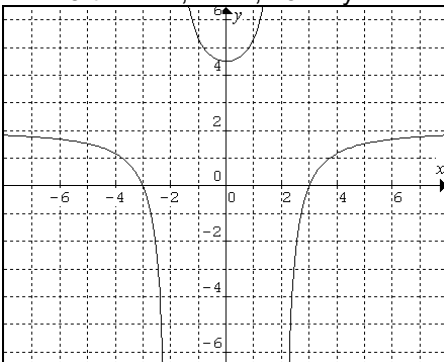
55. x-int:  $-1/2$ , 2, y-int:  $1/2$   
 vert:  $x = -1$ ,  $x = 4$ , horiz:  $y = 2$



63.



57. x-int: -3, 3, y-int:  $9/2$   
 vert:  $x = -2$ ,  $x = 2$ , horiz:  $y = 2$



65.

