

## Midterm Studyguide

Date \_\_\_\_\_ Period \_\_\_\_\_

**Simplify.**

1)  $\frac{2}{-2i}$

A)  $\frac{3i}{2}$       B)  $i$

C)  $2i$       D)  $-\frac{i}{2}$

2)  $\frac{3}{-10i}$

A)  $\frac{i}{2}$       B)  $\frac{3i}{13}$

C)  $\frac{i}{4}$       D)  $\frac{3i}{10}$

3)  $\frac{2}{\sqrt{5+5\sqrt{3}}}$

A)  $\frac{-\sqrt{5+5\sqrt{3}}}{35}$

B)  $\frac{-\sqrt{5+5}}{38}$

C)  $\frac{-\sqrt{6+8\sqrt{3}}}{93}$

D)  $\frac{-4\sqrt{6+20\sqrt{3}}}{69}$

4)  $(2i)(2i)(1-8i)$

A)  $-4+32i$       B)  $-32i$

C)  $4-32i$       D)  $4+32i$

5)  $(-1+3i)^2$

A)  $-8+6i$       B)  $-8-6i$

C)  $-18i$       D)  $9$

6)  $(3i)+(-6+8i)-(7i)$

A)  $-6+4i$       B)  $-6-2i$

C)  $-6+18i$       D)  $6-12i$

7)  $(-7+7i)^2$

A)  $32-126i$       B)  $98i$

C)  $-98i$       D)  $4$

8)  $\frac{7i}{7-4i}$

A)  $\frac{35i-28}{41}$       B)  $\frac{14+8i}{13}$

C)  $\frac{49i-28}{65}$       D)  $\frac{14i-7}{20}$

9)  $\frac{4i}{-2-7i}$

A)  $\frac{-8i-28}{53}$       B)  $\frac{-3+21i}{25}$

C)  $\frac{-2i-14}{25}$       D)  $\frac{-14+49i}{53}$

**Solve each equation by factoring.**

10)  $x^2 - 21 = -4x$

- A)  $\{3, -8\}$       B)  $\{5, 6\}$   
C)  $\{-7, -1\}$       D)  $\{3, -7\}$

11)  $3r^2 + 25r + 28 = 0$

- A)  $\left\{-\frac{4}{3}, 4\right\}$       B)  $\left\{\frac{1}{2}, -\frac{4}{5}\right\}$   
C)  $\left\{\frac{4}{3}, 7\right\}$       D)  $\left\{-\frac{4}{3}, -7\right\}$

**Solve each equation by taking square roots.**

12)  $3v^2 + 3 = -43$

- A)  $\left\{\frac{2i\sqrt{30}}{3}\right\}$   
B)  $\left\{\frac{i\sqrt{138}}{3}, -\frac{i\sqrt{138}}{3}\right\}$   
C)  $\left\{\frac{2i\sqrt{30}}{3}, -\frac{2i\sqrt{30}}{3}\right\}$   
D)  $\left\{-\frac{46}{3}, \frac{46}{3}\right\}$

**Solve each equation with the quadratic formula.**

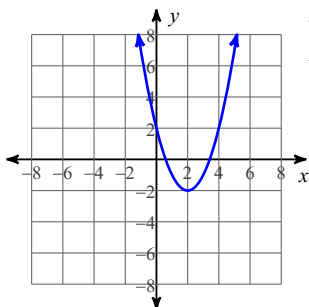
13)  $x^2 - 7 = 0$

- A)  $\left\{\frac{5}{2}, -8\right\}$       B)  $\left\{\frac{14}{3}, -6\right\}$   
C)  $\{\sqrt{7}, -\sqrt{7}\}$       D)  $\left\{1, -\frac{7}{6}\right\}$

Identify the vertex and axis of symmetry of each. Then sketch the graph.

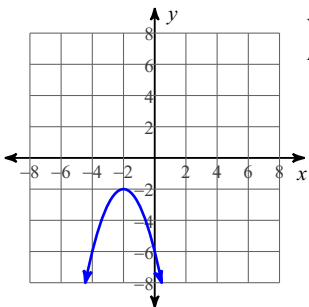
14)  $y = x^2 + 4x + 2$

A)



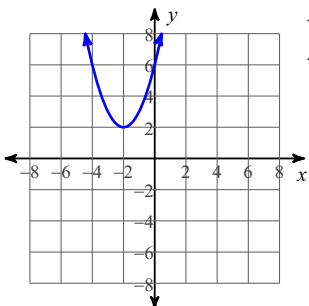
Vertex:  $(2, -2)$   
Axis of Sym.:  $x = 2$

B)



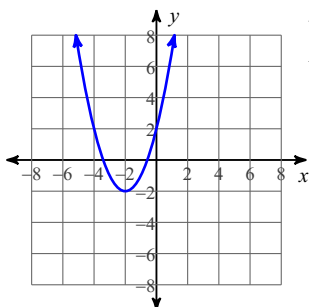
Vertex:  $(-2, -2)$   
Axis of Sym.:  $x = -2$

C)



Vertex:  $(-2, 2)$   
Axis of Sym.:  $x = -2$

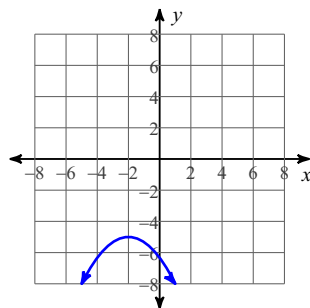
D)



Vertex:  $(-2, -2)$   
Axis of Sym.:  $x = -2$

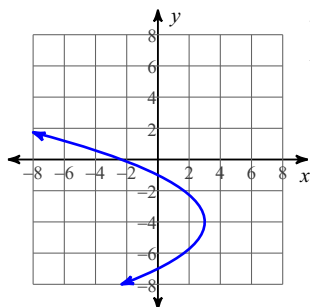
15)  $f(x) = -\frac{1}{3}x^2 + \frac{10}{3}x - \frac{31}{3}$

A)



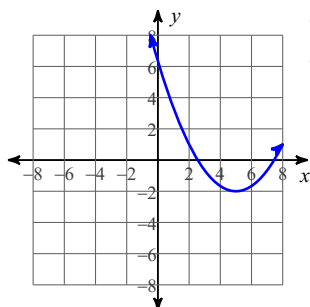
Vertex:  $(-2, -5)$   
Axis of Sym.:  $x = -2$

B)



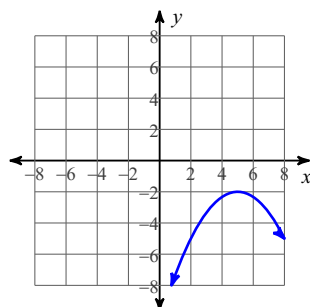
Vertex:  $(3, -4)$   
Axis of Sym.:  $y = -4$

C)



Vertex:  $(5, -2)$   
Axis of Sym.:  $x = 5$

D)

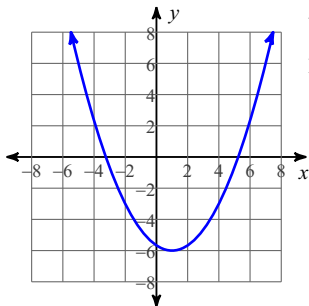


Vertex:  $(5, -2)$   
Axis of Sym.:  $x = 5$

Identify the vertex and focus of each. Then sketch the graph.

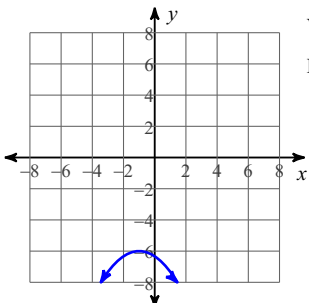
16)  $y = -\frac{1}{3}x^2 - \frac{2}{3}x - \frac{19}{3}$

A)



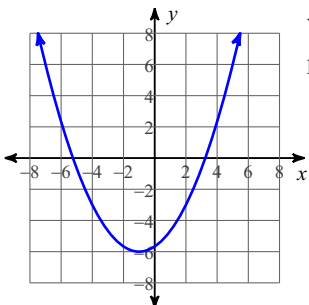
Vertex:  $(1, -6)$   
Focus:  $(1, -\frac{21}{4})$

B)



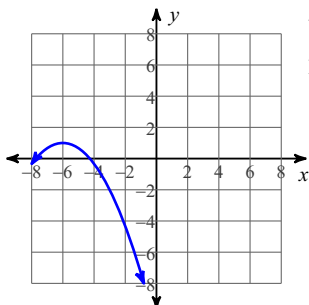
Vertex:  $(-1, -6)$   
Focus:  $(-1, -\frac{27}{4})$

C)



Vertex:  $(-1, -6)$   
Focus:  $(-1, -\frac{21}{4})$

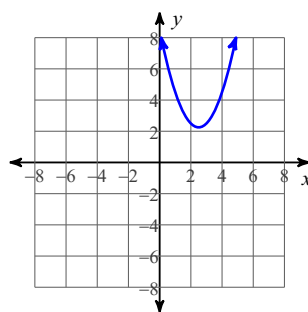
D)



Vertex:  $(-6, 1)$   
Focus:  $(-6, \frac{1}{4})$

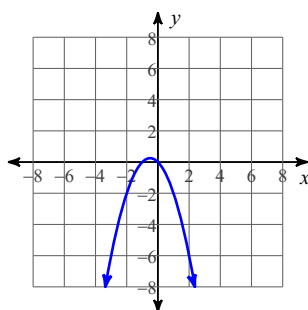
17)  $y = -(x - 4)(x - 1)$

A)



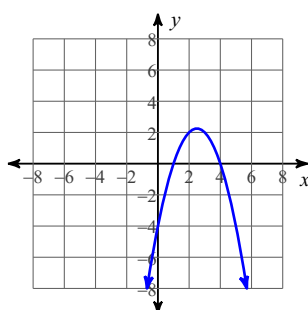
Vertex:  $(\frac{5}{2}, \frac{9}{4})$   
Focus:  $(\frac{5}{2}, \frac{5}{2})$

B)



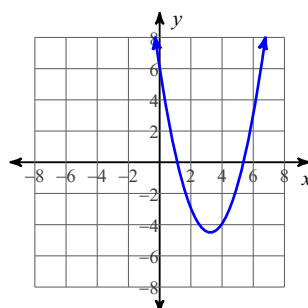
Vertex:  $(-\frac{1}{2}, \frac{1}{4})$   
Focus:  $(-\frac{1}{2}, 0)$

C)



Vertex:  $(\frac{5}{2}, \frac{9}{4})$   
Focus:  $(\frac{5}{2}, 2)$

D)



Vertex:  $(\frac{13}{4}, -\frac{9}{2})$   
Focus:  $(\frac{13}{4}, -\frac{17}{4})$

**Identify the min/max value, y-intercept, and x-intercepts of each.**

18)  $y = -2x^2 + 20x - 51$

A) Min value = 5

y-int: 6

x-int: None

B) Min value = -3

y-int: 69

x-int:  $\frac{12 + \sqrt{6}}{2}$  and  $\frac{12 - \sqrt{6}}{2}$

C) Min value = -1

y-int: 49

x-int:  $\frac{10 + \sqrt{2}}{2}$  and  $\frac{10 - \sqrt{2}}{2}$

D) Max value = -1

y-int: -51

x-int: None

19)  $y = -(x + 2)^2 + 49$

A) Min value = 49

y-int: 53

x-int: None

B) Max value = -49

y-int: -53

x-int: None

C) Max value = 49

y-int: 45

x-int: 5 and -9

D) Max value = -2

y-int: -2403

x-int: None

20)  $y = \frac{1}{2}x(x - 9)$

A) Min value =  $\frac{81}{8}$

y-int:  $\frac{81}{4}$

x-int: None

B) Max value =  $-\frac{9}{2}$

y-int:  $-\frac{7137}{128}$

x-int: None

C) Min value =  $\frac{65}{8}$

y-int:  $\frac{117}{4}$

x-int: None

D) Min value =  $-\frac{81}{8}$

y-int: 0

x-int: 0 and 9

**Factor each completely by grouping.**

21)  $9x^3 + 15x^2 + 12x + 20$

A)  $(3x^2 + 4)(3x^2 - 5)$

B)  $(3x^2 - 4)(3x - 5)$

C)  $(3x^2 + 4)(3x - 4)$

D)  $(3x^2 + 4)(3x + 5)$

22)  $2n^3 + 2n^2 + 5n + 5$

A)  $(2n^2 - 5)(n + 1)$

B)  $(2n^2 + 5)(n + 1)$

C)  $(2n^2 + 5)(n - 1)$

D)  $(2n^2 - 5)(n - 1)$

**Factor out a monomial.**

23)  $y = x^3 - 4x^2 + 3x$

- A)  $y = x(x - 1)(x - 3)$
- B)  $y = x(x - 1)(2x - 3)$
- C)  $y = x(x - 1)(x + 4)$
- D)  $y = x(x + 3)(2x - 3)$

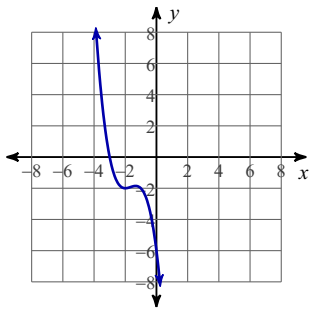
24)  $y = x^3 - x^2 - 2x$

- A)  $y = x(x + 1)(x - 2)$
- B)  $y = 3x(x + 1)(x - 2)$
- C)  $y = x(2x + 1)(x - 2)$
- D)  $y = x(x + 1)^2$

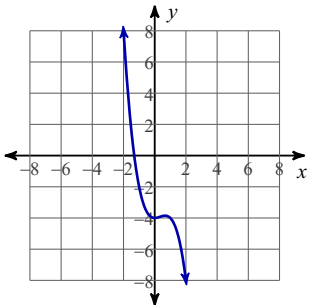
**Sketch the graph of each function.**

25)  $f(x) = -x^3 + x^2 - 4$

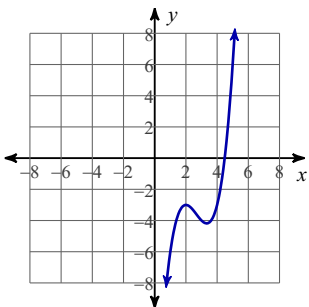
A)



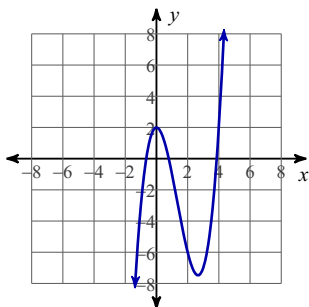
B)



C)

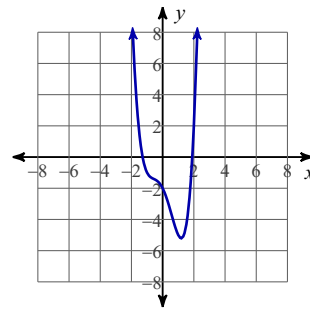


D)

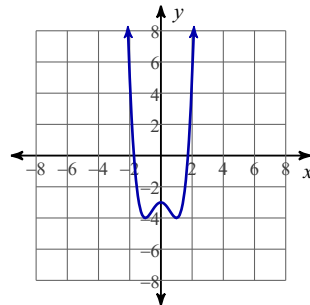


26)  $f(x) = x^4 - 2x^2 - 2x - 2$

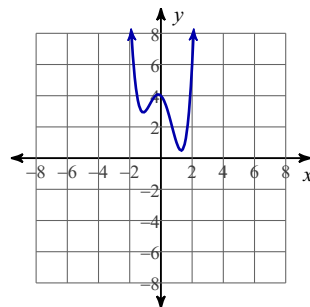
A)



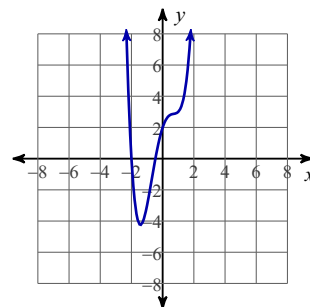
B)



C)



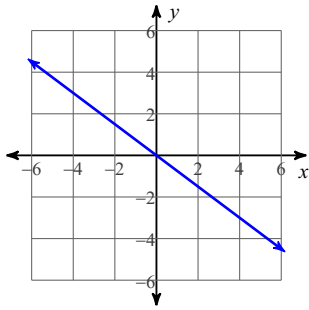
D)



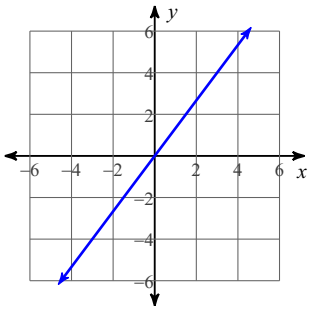
Sketch the graph of each line.

27)  $0 = 12y + 9x$

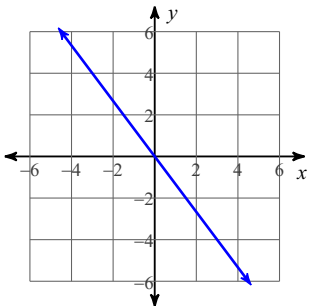
A)



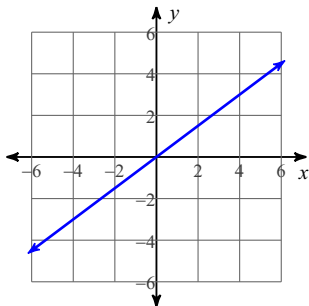
B)



C)



D)



Find each product.

28)  $(x - 5)(x^2 - 5x + 2)$

A)  $x^3 - 10x^2 + 27x - 10$

B)  $9x^3 - 9x^2 - 19x - 5$

C)  $4x^3 + 15 - 19x$

D)  $15x^3 + 56x^2 + 64x + 21$

**Simplify each sum.**

29)  $(2 - 3r^2 - r^4) + (4r^4 - 8r^2 - 8)$

- A)  $3r^4 - 3r^2 - 6$
- B)  $3r^4 - 11r^2 - 11$
- C)  $3r^4 - 3r^2 - 11$
- D)  $3r^4 - 11r^2 - 6$

**Simplify each difference.**

30)  $(m^4 - 4m^2 - m^3) - (3m^2 - 8m^3 - 4m^4)$

- A)  $5m^4 + 7m^3 - 14m^2$
- B)  $5m^4 + 7m^3 - 7m^2$
- C)  $5m^4 + 13m^3 - 14m^2$
- D)  $3m^4 + 13m^3 - 14m^2$



## Answers to Midterm Studyguide (ID: 1)

1) B  
5) B  
9) A  
13) C  
17) C  
21) D  
25) B  
29) D

2) D  
6) A  
10) D  
14) D  
18) D  
22) B  
26) A  
30) B

3) A  
7) C  
11) D  
15) D  
19) C  
23) A  
27) A

4) A  
8) C  
12) B  
16) B  
20) D  
24) A  
28) A