

## Midterm Final

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

**Evaluate each function.**

1)  $f(n) = 4n - 2$ ; Find  $f(-3)$

- A) -14      B) 22  
C) 34      D) -42

2)  $f(x) = \frac{2}{3}x - \frac{1}{2}$ ; Find  $f\left(\frac{9}{7}\right)$

- A)  $-\frac{13}{18}$       B)  $\frac{5}{6}$   
C)  $\frac{5}{14}$       D)  $-\frac{13}{10}$

3)  $k(x) = -4x$ ; Find  $k\left(\frac{x}{2}\right)$

- A)  $4x$       B)  $12x$   
C)  $-2x$       D)  $-12x$

**Find the inverse of each function.**

4)  $g(x) = \frac{3}{x-2}$

- A)  $g^{-1}(x) = \frac{4}{-x-1} - 2$   
B)  $g^{-1}(x) = \frac{2}{x-2} + 1$   
C)  $g^{-1}(x) = -\frac{2}{-x+3} + 1$   
D)  $g^{-1}(x) = \frac{3}{x} + 2$

5)  $f(x) = \frac{1}{x-2} - 2$

- A)  $f^{-1}(x) = \frac{1}{x+2} + 2$   
B)  $f^{-1}(x) = \frac{3}{x} - 2$   
C)  $f^{-1}(x) = -\frac{3}{x-1} + 2$   
D)  $f^{-1}(x) = \frac{1}{x} + 1$

**Perform the indicated operation.**

6)  $g(x) = x^3 - 3x^2$

$h(x) = 4x - 3$

Find  $(g \cdot h)(x)$

- A)  $4x^4 - 15x^3 + 9x^2$   
B)  $-3x^2 - 6x + 9$   
C)  $3x^4 + 4x^3 - 3x - 4$   
D)  $2x^2 - 5x - 25$

7)  $h(x) = x^2 + 4$

$g(x) = 2x - 5$

Find  $(h + g)(x)$

- A)  $x^2 + 2x - 1$       B)  $x^2 - 2x - 1$   
C)  $x + 1$       D)  $x^2 - 5x + 2$

8)  $g(x) = 3x^3 - 2x^2$   
 $h(x) = x + 2$   
 Find  $(g \circ h)(x)$

- A)  $3x^3 - 2x^2 + 2$
- B)  $27x^2 + 9x$
- C)  $3x^3 + 16x^2 + 28x + 16$
- D)  $-3x^3 - 2x^2 + 2$

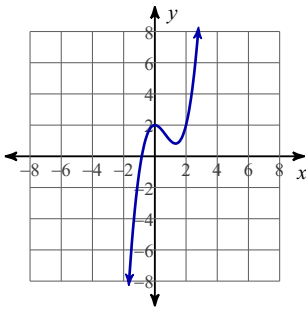
9)  $g(a) = -a + 3$   
 $f(a) = 3a^2 + 4$   
 Find  $(g \circ f)(3)$

- A) -13
- B) -28
- C) 112
- D) 4

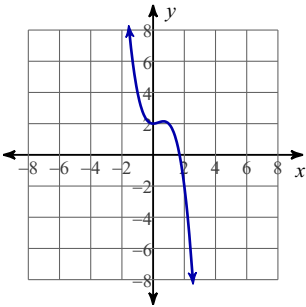
**Sketch the graph of each function.**

10)  $f(x) = x^3 - 12x^2 + 45x - 52$

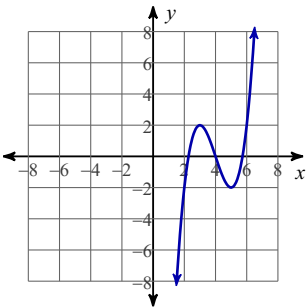
A)



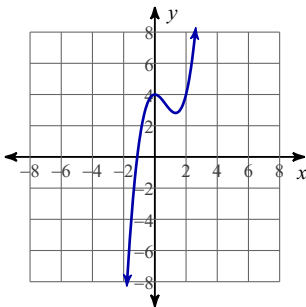
B)



C)

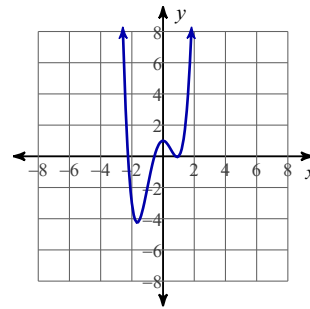


D)

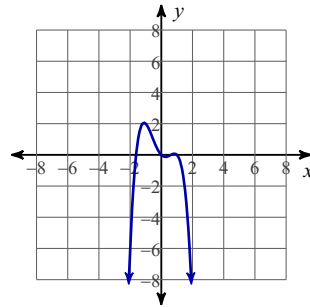


11)  $f(x) = x^4 + x^3 - 3x^2 + 1$

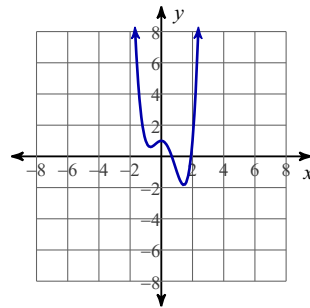
A)



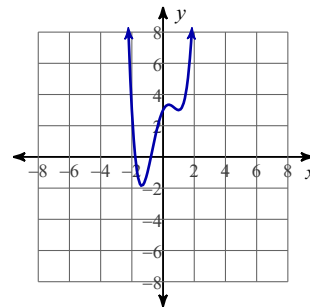
B)



C)



D)



**Find all zeros.**

12)  $f(x) = 3x^2 - 13x + 12$

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

**State the possible rational zeros for each function. Then find all zeros.**

13)  $f(x) = x^3 + 8x^2 + 14x + 4$

A) Possible rational zeros:  $\pm 1, \pm 2, \pm 4$ 

Zeros:  $\{-1, -3 + \sqrt{7}, -3 - \sqrt{7}\}$

B) Possible rational zeros:  $\pm 1, \pm 2, \pm 4$ 

Zeros:  $\{-2, -3 + \sqrt{7}, -3 - \sqrt{7}\}$

C) Possible rational zeros:  $\pm 1, \pm 2, \pm 4$ 

Zeros:  $\{-2, -4 + \sqrt{14}, -4 - \sqrt{14}\}$

D) Possible rational zeros:  $\pm 1, \pm \frac{1}{2}, \pm \frac{1}{4}$ 

Zeros:  $\{-1, -3 + \sqrt{7}, -3 - \sqrt{7}\}$

**Divide.**

14)  $(a^5 - 2a^4 - 3a^2 + 6a - 6) \div (a - 2)$

A)  $a^4 - 3a - \frac{4}{a - 2}$

B)  $a^4 - 3a - 2 - \frac{9}{a - 2}$

C)  $a^4 - 3a - 1 - \frac{3}{a - 2}$

D)  $a^4 - 3a - \frac{6}{a - 2}$

**Simplify.**

15)  $\frac{10}{-9i}$

A)  $\frac{11i}{9}$       B)  $i$

C)  $\frac{8i}{9}$       D)  $\frac{10i}{9}$

16)  $\frac{6 + 10i}{9 - 4i}$

A)  $\frac{14 + 114i}{97}$

B)  $\frac{2 + 94i}{65}$

C)  $\frac{6 + 10i}{5}$

D)  $\frac{126 + 56i}{97}$

17)  $(8 + 8i)(-6 + 4i)$

- A)  $16 + 80i$       B)  $-16 + 80i$   
C)  $16 - 80i$       D)  $-80 - 16i$

18)  $(3 + 6i) - (-7 - 4i)$

- A)  $4 - 2i$       B)  $10 + 10i$   
C)  $-4 + 10i$       D)  $10 + 2i$

**Find the exact value of each trigonometric function.**

19)  $\sec \frac{\pi}{3}$

- A)  $-\frac{\sqrt{3}}{2}$       B)  $\frac{\sqrt{3}}{3}$   
C) 2      D)  $\sqrt{2}$

20)  $\sin -\frac{\pi}{6}$

- A)  $\frac{\sqrt{3}}{2}$       B)  $-\frac{1}{2}$   
C)  $\sqrt{3}$       D)  $-\sqrt{3}$

21)  $\cos \frac{3\pi}{2}$

- A) -1      B)  $-\frac{1}{2}$   
C)  $\frac{2\sqrt{3}}{3}$       D) 0

22)  $\sec 0$

- A) 1      B)  $-\frac{2}{2}$   
C) Undefined      D)  $\sqrt{2}$

23)  $\csc \frac{\pi}{2}$

- A) -1      B) 0  
C) Undefined      D) 1

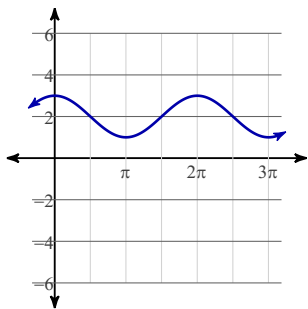
24)  $\cot \frac{15\pi}{4}$

- A) -1      B)  $\sqrt{2}$   
C) 2      D)  $-\sqrt{3}$

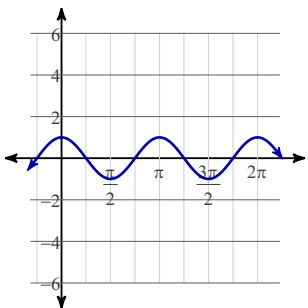
**Graph each function using radians.**

25)  $y = \sin \theta$

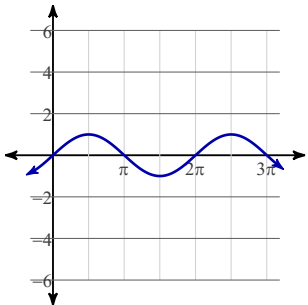
A)



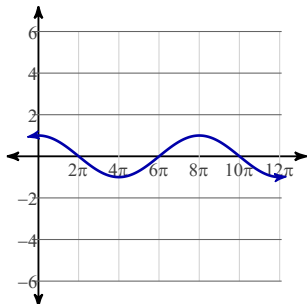
B)



C)

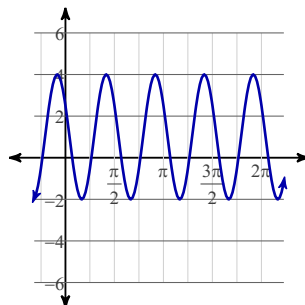


D)

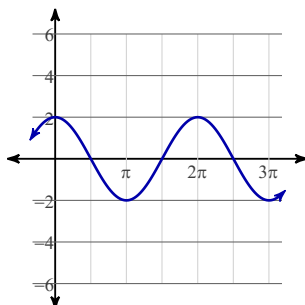


26)  $y = 3\cos\left(4\theta + \frac{\pi}{3}\right) + 1$

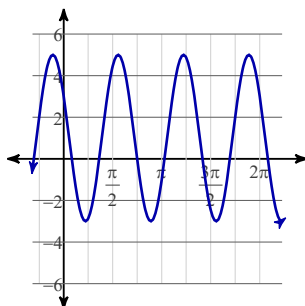
A)



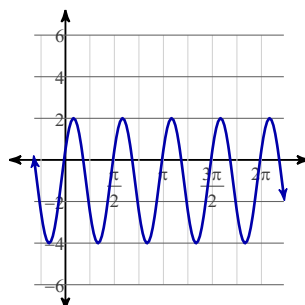
B)



C)



D)



**Find the value of the trig function indicated.**

27) Find  $\csc \theta$  if  $\tan \theta = 2\sqrt{2}$

- A) 3      B)  $\frac{\sqrt{5}}{5}$   
 C)  $\frac{4}{3}$       D)  $\frac{3\sqrt{2}}{4}$

28) Find  $\cos \theta$  if  $\sec \theta = \frac{5\sqrt{10}}{13}$

- A)  $\frac{13\sqrt{10}}{50}$       B)  $\frac{24}{7}$   
 C)  $\frac{5}{4}$       D)  $\frac{7}{24}$

29) Find  $\sin \theta$  if  $\cot \theta = \frac{3}{4}$

- A)  $\frac{5}{3}$       B)  $\frac{3}{4}$   
 C)  $\frac{4}{5}$       D)  $\frac{5}{4}$

30) Find  $\tan \theta$  if  $\sec \theta = \frac{25}{7}$

- A)  $\frac{24}{25}$       B)  $\frac{25}{24}$   
 C)  $\frac{5}{3}$       D)  $\frac{24}{7}$

**Solve each equation. Round your answers to the nearest ten-thousandth.**

31)  $10^{-3v} - 1 = -1$

- A) No solution.      B)  $-0.02$   
 C)  $-0.04$       D)  $0.02$

32)  $14^{-6p} - 3 = 83$

- A)  $-0.7527$       B)  $-0.2813$   
 C)  $-0.3224$       D)  $-0.7424$

**Simplify. Your answer should contain only positive exponents.**

33)  $x^4 y^2 \cdot 2x^2 y^2$

- A)  $\frac{6y^4}{x}$       B)  $\frac{9}{y^4 x^2}$   
 C)  $2x^6 y^4$       D)  $3yx$

34)  $4xy^{-1} \cdot yx^{-1} \cdot 3x^{-1}y^3$

- A)  $3x^7$       B)  $\frac{12y^3}{x}$   
 C)  $\frac{8y^8}{x^2}$       D)  $\frac{8}{y^7 x^2}$

**Solve each equation.**

35)  $\log_{14} -3r = \log_{14} 27$

- A)  $\{1\}$       B)  $\left\{\frac{4}{3}\right\}$   
 C)  $\{-9\}$       D)  $\left\{\frac{1}{2}\right\}$

36)  $\log_{20} 28 = \log_{20} (4x + 8)$

- A)  $\{-2\}$       B)  $\left\{\frac{13}{12}\right\}$   
 C)  $\{5\}$       D)  $\{0\}$

37)  $\log_7 9 + \log_7 4x^2 = 2$

- A)  $\{1, -1\}$       B)  $\{1\}$   
 C)  $\left\{\frac{7}{6}, -\frac{7}{6}\right\}$       D) No solution.

38)  $\log_5 10 - \log_5 -2x = 1$

- A)  $\left\{\frac{25}{4}\right\}$       B) No solution.  
 C)  $\left\{-\frac{4}{25}\right\}$       D)  $\{-1\}$

**Use a calculator to approximate each to the nearest thousandth.**

39)  $\log_5 27$

- A) 1.454      B) 2.168  
 C) 2.048      D) 1.295

40)  $\log_2 51$

- A) 4.143      B) 5.672  
 C) 6.2      D) 6.044

**Condense each expression to a single logarithm.**

41)  $10 \log_4 a - 5 \log_4 b$

- A)  $\log_4 \frac{a^{10}}{b^5}$
- B)  $\log_4 (c^3 \sqrt{ba})$
- C)  $\log_4 \sqrt[3]{cba}$
- D)  $\log_4 (b^{10} a^5)$

42)  $3 \log_2 10 + 5 \log_2 11$

- A)  $\log_2 \frac{10^3}{11^5}$
- B)  $\log_2 (11^5 \cdot 10^3)$
- C)  $\log_2 \sqrt{770}$
- D)  $\log_2 (11^{15} \cdot 10^5)$

**Expand each logarithm.**

43)  $\log_5 (a^2 \cdot b)^4$

- A)  $\log_5 a + \log_5 b + 2 \log_5 c$
- B)  $8 \log_5 a + 4 \log_5 b$
- C)  $\frac{\log_5 a}{3} + \frac{\log_5 b}{3} + \frac{\log_5 c}{3}$
- D)  $\log_5 c + \frac{\log_5 a}{3} + \frac{\log_5 b}{3}$

44)  $\log_7 (u \cdot v \cdot w^5)$

- A)  $5 \log_7 u - 25 \log_7 v$
- B)  $25 \log_7 u - 5 \log_7 v$
- C)  $\log_7 u + \log_7 v + 5 \log_7 w$
- D)  $\frac{\log_7 u}{3} + \frac{\log_7 v}{3} + \frac{\log_7 w}{3}$

**Solve each equation for  $0 \leq \theta < 2\pi$ .**

45)  $\frac{\sqrt{3}}{4} = -\frac{1}{4} \cdot \tan \theta$

46)  $-\frac{1}{5} \cdot \sin \theta = \frac{1}{5}$

47)  $3 + \cos \theta = \frac{6 - \sqrt{3}}{2}$

48)  $-3 = -3 + \sin \theta$

49)  $0 = \csc \theta$

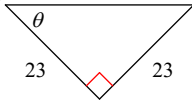
50)  $-2 + \sec \theta = \frac{-6 - 2\sqrt{3}}{3}$

51)  $-3 + \csc \theta = -4$

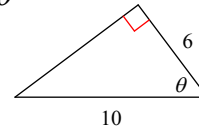
52)  $\sec \theta = 2$

Find the value of the trig function indicated.

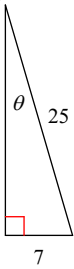
53)  $\csc \theta$



54)  $\sin \theta$



55)  $\sec \theta$



56)  $\sec \theta$

