

Spring Semester Multiple Choice Final Exam Review – Honors Algebra 3-4

1 a. Convert to degrees:  $\theta = \frac{11\pi}{8}$  radians.

- A  $1.35^\circ$
- B  $67.5^\circ$
- C  $123.75^\circ$
- D  $247.5^\circ$

b. Convert to radians:  $\theta = 245^\circ$ , leave answer in terms of  $\pi$ .

- A  $\frac{13\pi}{36}$
- B  $\frac{49\pi}{72}$
- C  $\frac{49\pi}{36}$
- D  $\frac{49\pi}{18}$

2. If the cotangent of an acute angle is  $\frac{3}{4}$ , find the value of the cosecant.

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

3. Find the reference angle for  $\theta = 230^\circ$ .

- A  $-50^\circ$
- B  $40^\circ$
- C  $50^\circ$
- D  $130^\circ$

4. Given the  $\tan \theta = 2.5849$ , find  $\theta$ .

- A  $.0451^\circ$
- B  $1.2017^\circ$
- C  $21.1496^\circ$
- D  $68.8504^\circ$

5. Given  $\tan \theta = \frac{24}{7}$  and  $\sec \theta < 0$ , find  $\sin \theta$ .

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

6. Given  $\cos \theta = \frac{2}{7}$  and  $\cot \theta < 0$ , find  $\sin \theta$ .

A  $\frac{-\sqrt{53}}{7}$

B  $\frac{-3\sqrt{5}}{7}$

C  $\frac{3\sqrt{5}}{7}$

D  $\frac{\sqrt{53}}{7}$

7. A 20 foot ladder rests on the side of a building. If the ladder is 8 feet from the base of the building, find the angle of elevation that the ladder makes with the ground to the nearest degree.

A  $22^\circ$

B  $24^\circ$

C  $66^\circ$

D  $68^\circ$

8. From fire tower A, a fire with bearing  $N78^\circ E$  is sighted. The same fire is sighted from tower B with bearing  $N51^\circ W$ . Tower B is 70 miles directly east of tower A. How far, to the nearest mile, is it from tower A to the fire?

A 19 miles

B 57 miles

C 70 miles

D 88 miles

9. Find the exact value of the expression:  $\sin \left[ \tan^{-1} \left( \frac{-12}{5} \right) \right]$

A  $\frac{-12}{13}$

B  $\frac{-5}{13}$

C  $\frac{5}{13}$

D  $\frac{12}{13}$

10. Find the exact value of the expression:  $\csc \left[ \cos^{-1} \left( \frac{-\sqrt{3}}{2} \right) \right]$

A -2

B  $\frac{-\sqrt{21}}{7}$

C  $\frac{\sqrt{21}}{7}$

D 2

11. Find the period in degrees:  $f(x) = \sin \left( \frac{1}{3}x \right)$

A  $60^\circ$

B  $120^\circ$

C  $540^\circ$

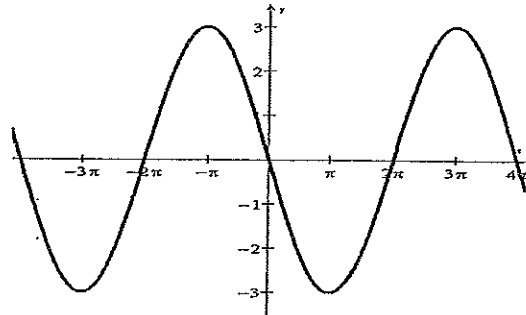
D  $1080^\circ$

12. Find the period in degrees:  $f(x) = \cos(4x)$

- A  $45^\circ$
- B  $90^\circ$
- C  $720^\circ$
- D  $1440^\circ$

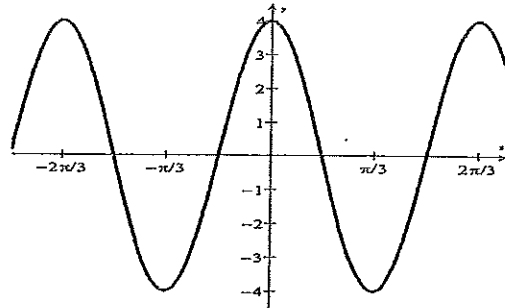
13. Write the sine equation for the following:

- A  $y = -3 \sin\left(\frac{\theta}{2}\right)$
- B  $y = -3 \sin(2\theta)$
- C  $y = 3 \sin\left(\frac{\theta}{2}\right)$
- D  $y = 3 \sin(2\theta)$



14. Write the cosine equation for the following:

- A  $y = -4 \cos\left(\frac{\theta}{3}\right)$
- B  $y = -4 \cos(3\theta)$
- C  $y = 4 \cos\left(\frac{\theta}{3}\right)$
- D  $y = 4 \cos(3\theta)$



15. Simplify:  $\csc^4 x - \cot^4 x$

- A  $\csc^2 x - \cot^2 x$
- B  $\csc^2 x + \cot^2 x$
- C  $2 \cot^2 x - 1$
- D  $2 \csc^2 x + 1$

16. Simplify:  $\frac{\sec x - \cos x}{\tan^2 x}$

- A -1
- B 1
- C  $\sin x$
- D  $\cos x$

17. Perform the subtraction and simplify:  $\frac{\csc x}{\sin x} - \frac{\cot x}{\tan x}$

- A -1
- B 0
- C 1
- D  $\sin^2 x - \tan^2 x$

18. Perform the subtraction and simplify:  $\tan x - \frac{\sec^2 x}{\tan x}$

- A  $-\cot x$
- B  $-\tan x$
- C  $\cot x$
- D  $\tan x$

19. Find all solutions in the interval  $[0, 2\pi)$ :  $2\sin x + \sqrt{3} = 0$
- A  $\frac{\pi}{6}, \frac{5\pi}{6}$   
 B  $\frac{\pi}{3}, \frac{2\pi}{3}$   
 C  $\frac{7\pi}{6}, \frac{11\pi}{6}$   
 D  $\frac{4\pi}{3}, \frac{5\pi}{3}$
20. Find all solutions in the interval  $[0, 2\pi)$ :  $\tan x \sec x = \tan x$
- A 0  
 B 0, 1  
 C 0,  $\pi$   
 D  $0, \frac{\pi}{2}, \pi$
21. Find all solutions in the interval  $[0, 2\pi)$ :  $\csc^2 x - \csc x = 2$
- A  $\frac{\pi}{6}, \frac{3\pi}{2}$   
 B  $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$   
 C  $\frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}$   
 D 2, -1
22. Find all solutions in the interval  $[0, 2\pi)$ :  $2\cos^2 x + 3\cos x + 1 = 0$
- A  $\frac{\pi}{6}, \frac{11\pi}{6}, 0$   
 B  $\frac{\pi}{3}, \frac{5\pi}{3}, 0$   
 C  $\frac{5\pi}{6}, \frac{7\pi}{6}, \pi$   
 D  $\frac{2\pi}{3}, \frac{4\pi}{3}, \pi$
23. Evaluate:  $\sin 165^\circ$  (Use the fact that  $165^\circ = 135^\circ + 30^\circ$ ).
- A  $\frac{\sqrt{2} - \sqrt{6}}{4}$   
 B  $\frac{\sqrt{6} - \sqrt{2}}{4}$   
 C  $\frac{\sqrt{6} + \sqrt{2}}{4}$   
 D  $\frac{1 + \sqrt{3}}{2}$

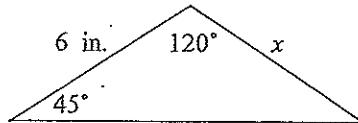
24. Write the expression as the sine, cosine, or tangent of an angle:  $\cos 125^\circ \cos 40^\circ - \sin 125^\circ \sin 40^\circ$
- A  $\cos 85^\circ$   
 B  $\sin 85^\circ$   
 C  $\cos 165^\circ$   
 D  $\sin 165^\circ$
25. Given  $\sec u = \frac{-5}{4}$ ,  $\frac{\pi}{2} < u < \pi$  and  $\cot v = \frac{-15}{8}$ ,  $\frac{3\pi}{2} < v < 2\pi$ , find  $\sin(u-v)$ .
- A  $\frac{-36}{85}$   
 B  $\frac{13}{85}$   
 C  $\frac{77}{85}$   
 D  $\frac{91}{85}$
26. Given  $\csc u = \frac{13}{12}$ ,  $0 < u < \frac{\pi}{2}$  and  $\tan v = \frac{7}{24}$ ,  $\pi < v < \frac{3\pi}{2}$ , find  $\cos(u-v)$ .
- A  $\frac{-204}{325}$   
 B  $\frac{-187}{325}$   
 C  $\frac{-36}{325}$   
 D  $\frac{437}{325}$
27. Find the area of the triangle to the nearest tenth, with sides of length, 43, 53, and 72.
- A 123.5  
 B 1131.9  
 C 3712.6  
 D 15,099.6
28. In  $\triangle ABC$ ,  $BC = 6$ ,  $AC = 10$  and  $m\angle C = 120^\circ$ . What is the area of  $\triangle ABC$ ?
- A 15  
 B  $15\sqrt{3}$   
 C 30  
 D  $30\sqrt{3}$
29. Given a triangle with sides  $a = 55$ ,  $b = 25$ , and  $c = 72$ , find  $m\angle C$ .
- A 17  
 B 39  
 C 56  
 D 124

30. Given a triangle with  $A=109^\circ$ ,  $b=13$ , and  $c=10$ , find  $a$ .

- A 18.81
- B 20.47
- C 23.16
- D 353.65

31. Solve for  $x$  in the given triangle.

- A 2.20 in.
- B 4.39 in.
- C 7.85 in.
- D 16.39 in.



32. Find all possible measures for angle B, given:  $A = 58^\circ$ ,  $a = 11.4$ , and  $b = 12.8$

- A  $72^\circ$
- B  $108^\circ$
- C Both A and B
- D no triangle exists

33. Rewrite the following in trigonometric form of  $5i$ .

- A  $5(\cos 0 + i \sin 0)$
- B  $5\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}\right)$
- C  $5(\cos \pi + i \sin \pi)$
- D  $5\left(\cos \frac{3\pi}{2} + i \sin \frac{3\pi}{2}\right)$

34. Use DeMoivre's theorem to evaluate:  $[3(\cos 80^\circ + i \sin 80^\circ)]^4$

- A  $3(\cos 320^\circ + i \sin 320^\circ)$
- B  $12(\cos 320^\circ + i \sin 320^\circ)$
- C  $81(\cos 80^\circ + i \sin 80^\circ)$
- D  $81(\cos 320^\circ + i \sin 320^\circ)$

35. Determine which of the following is a cube root of  $-64$  using DeMoivre's theorem.

- A  $-4(\cos 180^\circ + i \sin 180^\circ)$
- B  $4(\cos 60^\circ + i \sin 60^\circ)$
- C  $4(\cos 120^\circ + i \sin 120^\circ)$
- D  $64(\cos 60^\circ + i \sin 60^\circ)$

36. Write an explicit formula for the arithmetic sequence:  $-6, -2, 2, 6, \dots$

- A  $-4n-2$
- B  $4n-2$
- C  $4n-7$
- D  $4n-10$

37. Write an explicit formula for the arithmetic sequence with a first term of 15 and a common difference of 4.
- A  $4 + (n-1)15$   
 B  $4 - (n-1)15$   
 C  $15 + (n-1)4$   
 D  $15 - (n-1)4$
38. Find the 90<sup>th</sup> term of the arithmetic sequence with  $a_1 = 3$  and  $a_2 = 9$ . (Assume that n begins with 1)
- A -531  
 B 273  
 C 537  
 D 804
39. Find the sum of the first 100 terms of the arithmetic sequence whose nth term is  $a_n = 9n - 6$ . (Assume that n begins with 1).
- A 894  
 B 44,550  
 C 44,850  
 D 49,700
40. Find the sum:  $\sum_{n=2}^7 \frac{2}{n+3}$
- A  $\frac{12}{45}$   
 B  $\frac{2131}{1260}$   
 C  $\frac{2761}{1260}$   
 D  $\frac{179}{10}$
41. Evaluate:  $\sum_{n=1}^8 5\left(\frac{2}{3}\right)^{n-1}$
- A 3  
 B  $\frac{10}{3}$   
 C  $\frac{15}{2}$   
 D 15
42. Find the coefficient of  $x^3y^3$  in the expansion of  $(3x - 2y)^6$
- A -25920  
 B -4320  
 C -216  
 D 20

43. Find the coefficient of  $x^2y^2$  in the expansion of  $(x + 4y)^9$
- A 16
  - B 36
  - C 576
  - D 1152
44. A card is drawn at random from a standard deck of 52 playing cards. Find the probability that the card is a face card.
- A  $\frac{1}{13}$
  - B  $\frac{3}{13}$
  - C  $\frac{1}{4}$
  - D  $\frac{4}{13}$
45. A password is comprised of 3 letters followed by 4 digits. How many passwords are possible?
- A 118
  - B 26,000,000
  - C 175,760,000
  - D 456,976,000
46. A phone number has seven digits. How many different telephone numbers are possible if it cannot begin with 0 or 1?
- A 5040
  - B 604,800
  - C 2,097,152
  - D 8,000,000
47. A bag contains 9 quarters, 5 dimes, and 3 nickels. If three coins are selected without replacement, what is the probability of selecting three quarters?
- A  $\frac{1}{504}$
  - B  $\frac{504}{4913}$
  - C  $\frac{21}{170}$
  - D  $\frac{763}{510}$
48. A class is given a list of 20 study questions from which 12 will be part of their upcoming final. If a given student knows how to solve 15 of the problems, find the probability that the student will be able to answer 10 questions correctly.
- A  $\frac{455}{184756}$
  - B  $\frac{77}{3230}$
  - C  $\frac{77}{323}$
  - D  $\frac{5}{6}$



49. A drama teacher must fill extra roles for 7 females and 5 males for the upcoming school production of "Cats". If 10 females and 8 males tryout and all are equally qualified, in how many ways can the teacher choose the cast?

- A 35
- B 80
- C 176
- D 6720

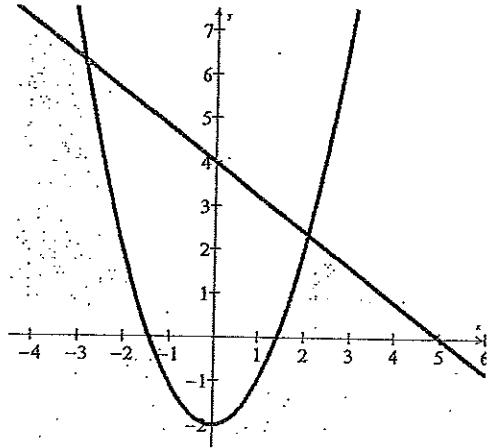
50. Match the graph with the correct system of inequalities.

A  $\begin{cases} 4x + 5y \leq 20 \\ y \leq x^2 - 2 \end{cases}$

B  $\begin{cases} 4x + 5y \geq 20 \\ y \geq x^2 - 2 \end{cases}$

C  $\begin{cases} 4x + 5y \geq 20 \\ y \leq x^2 - 2 \end{cases}$

D  $\begin{cases} 4x + 5y \leq 20 \\ y \geq x^2 - 2 \end{cases}$



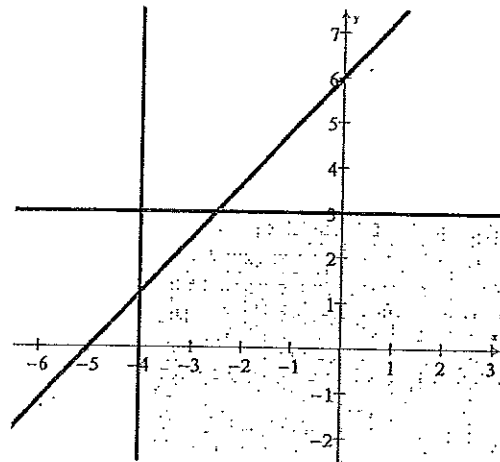
51. Graph the system of inequalities.

A  $\begin{cases} 6x - 5y \geq -30 \\ x \geq -4 \\ y \leq 3 \end{cases}$

B  $\begin{cases} 6x - 5y \leq -30 \\ x \geq -4 \\ y \leq 3 \end{cases}$

C  $\begin{cases} 6x - 5y \leq -30 \\ x \leq -4 \\ y \geq 3 \end{cases}$

D  $\begin{cases} 6x - 5y \geq -30 \\ x \leq -4 \\ y \geq 3 \end{cases}$



52. A small business invests \$16,000 to produce an item that will sell for \$5.95. Each unit can be produced for \$3.45. Find the sales necessary to break even.

- A 640
- B 1702
- C 6400
- D 64,000

53. Solve the following system by the method of Substitution:

$$4x^2 + y = 3$$

$$x + y = -11$$

- A  $(2, -13)$   
B  $\left(\frac{-7}{4}, 2\right)$   
C  $\left(\frac{7}{4}, \frac{-51}{4}\right), (-2, -9)$   
D  $\left(\frac{-7}{4}, \frac{-37}{4}\right), (2, -13)$

54. Solve the system of linear equations:

$$2x - y + 3z = 26$$

$$2y - z = 12$$

$$7x - 5y = -8$$

- A  $(6, 10, 8)$   
B  $(11, 8, 4)$   
C  $(16, 6, 0)$   
D  $(21, 4, -4)$

55. Solve the system of linear equations:

$$3x - 2y = 8$$

$$x + 2y = 0$$

$$x + y = 6$$

- A  $(2, -1)$   
B  $(6 - a, a)$   
C  $(12, -6)$   
D no solution

56. Solve the system of linear equations:

$$2x + 4y - 2z = 0$$

$$3x + 5y = 1$$

- A  $(-5a + 2, 3a - 1, a)$   
B  $(5a + 2, -3a - 1, a)$   
C  $(2, 1, 4)$   
D no solution

57. Given:  $A = \begin{bmatrix} 8 & -1 \\ 2 & 3 \\ -4 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 6 \\ -1 & -5 \\ 1 & 10 \end{bmatrix}$  Find:  $6B-5A$

A  $\begin{bmatrix} -34 & 41 \\ -16 & -45 \\ 26 & 35 \end{bmatrix}$

B  $\begin{bmatrix} 43 & -36 \\ 17 & 43 \\ -29 & -20 \end{bmatrix}$

C  $\begin{bmatrix} 53 & 24 \\ 7 & -7 \\ -19 & 80 \end{bmatrix}$

D  $\begin{bmatrix} 46 & 31 \\ 4 & -15 \\ -14 & 85 \end{bmatrix}$

58. Find the product of matrices:  $\begin{bmatrix} 9 & 2 & 5 \\ 1 & 0 & 3 \\ 6 & 2 & -4 \end{bmatrix} \begin{bmatrix} 4 & -2 & 7 \\ -7 & 1 & 0 \\ -2 & 2 & 8 \end{bmatrix}$

A  $\begin{bmatrix} 12 & -6 & 103 \\ -2 & 4 & 31 \\ 18 & -18 & 10 \end{bmatrix}$

B  $\begin{bmatrix} 36 & -4 & 35 \\ -7 & 0 & 0 \\ -12 & 4 & -32 \end{bmatrix}$

C  $\begin{bmatrix} 36 & -2 & 42 \\ -14 & 0 & 0 \\ -10 & 6 & -32 \end{bmatrix}$

D  $\begin{bmatrix} 76 & 22 & -14 \\ -62 & -14 & -32 \\ 32 & 12 & -36 \end{bmatrix}$

59. Given:  $A = \begin{bmatrix} 6 & 15 \\ -8 & -3 \end{bmatrix}$ , Find  $A^{-1}$

A  $\begin{bmatrix} \frac{-1}{34} & \frac{-5}{34} \\ \frac{4}{51} & \frac{1}{17} \end{bmatrix}$

B  $\begin{bmatrix} \frac{1}{6} & \frac{1}{15} \\ \frac{-1}{8} & \frac{-1}{3} \end{bmatrix}$

C  $\begin{bmatrix} \frac{1}{46} & \frac{5}{46} \\ \frac{-4}{69} & \frac{-1}{23} \end{bmatrix}$

D  $\begin{bmatrix} -6 & -15 \\ 8 & 3 \end{bmatrix}$

60. Find the determinant of the matrix:  $\begin{bmatrix} 10 & 8 & 3 & -7 \\ 4 & 0 & 5 & -6 \\ 0 & 3 & 2 & 7 \\ 1 & 0 & -3 & 2 \end{bmatrix}$

- A -2163
- B -1167
- C -453
- D -399

HONORS ALGEBRA 3-4  
2<sup>nd</sup> Semester Final Exam Formulas

Sum and Difference Formulas

$$\sin(u + v) = \sin u \cos v + \cos u \sin v$$

$$\sin(u - v) = \sin u \cos v - \cos u \sin v$$

$$\cos(u + v) = \cos u \cos v - \sin u \sin v$$

$$\cos(u - v) = \cos u \cos v + \sin u \sin v$$

$$\tan(u + v) = \frac{\tan u + \tan v}{1 - \tan u \tan v}$$

$$\tan(u - v) = \frac{\tan u - \tan v}{1 + \tan u \tan v}$$

Area of a Triangle

$$\text{Area} = \frac{1}{2}bc \sin A = \frac{1}{2}ab \sin C = \frac{1}{2}ac \sin B$$

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$s = \frac{(a+b+c)}{2}$$

Arithmetic Sequences

$$a_n = a_1 + d(n-1) \quad \text{-OR-} \quad a_n = dn + a_0$$

$$S_n = \frac{n}{2}(a_1 + a_n)$$

Geometric Sequences

$$a_n = a_1 r^{n-1}$$

$$S_n = a_1 \left( \frac{1-r^n}{1-r} \right) \quad (\text{Finite sum})$$

$$S_n = \frac{a_1}{1-r} \quad (\text{Infinite sum, } |r| < 1)$$

DeMoivre's Theorem

$$z^n = [r(\cos \theta + i \sin \theta)]^n$$

$$z^n = r^n (\cos n\theta + i \sin n\theta)$$

Law of Sines

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Law of Cosines

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

**Remember: Check your mode when doing trig problems!! Good luck & have a great summer!!**

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