

Final Exam June - 04

1. ? is the equation that relates cost (C) to distance(d) for "Short-Haul Trucking" if there is a basic charge of \$10.00 and a charge of \$0.15 per kilometer ? .

- A)  $y = C + d$       B)  $y = 10d + C$       C)  $C = 0.15d + 10$       D)  $C = 10d + 15$

2. The equation for the charges of a long distance phone company is ? , if the basic monthly charge is \$18.00, the charge for local call is \$0.11 per minute and \$0.55 per minute for calls to the U.S. ( C = charge , L =number of minutes of local calls and U = number minutes in calls to the U.S.)

- A)  $C = 18 + 11L + 0.55U$       B)  $C = 18 + 0.11L + 0.55U$       C)  $18 = C + L + U$       D)  $18 + 0.11 + 0.55 = C + L + U$

3. The z-intercept of  $5x + 20y - 4z = 20$  is ? .

- A) (5, 20, -4)      B) (4, 1, -5)      C) (0, 0, z)      D) (0, 0, -5)

4. ? is the sum of the first equation and the second.  $\begin{cases} x + y = 4 \\ -x - 2y = 2 \end{cases}$

- A)  $2x = 2$       B)  $x(-x) + y(2y) = 6$       C)  $-y = 6$       D) cannot add equations

5. For the system  $\begin{cases} x + 3y = 3 \\ 2x - y = -2 \end{cases}$  , the corresponding matrix equation is ? .

- A)  $\begin{pmatrix} 1 & 3 \\ 2 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$       B)  $\begin{pmatrix} x \\ y \end{pmatrix} \begin{pmatrix} 1 & 3 \\ 2 & -1 \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$       C)  $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \end{pmatrix} \begin{pmatrix} 1 & 3 \\ 2 & -1 \end{pmatrix}$       D)  $\begin{pmatrix} 1 & 3 \\ 2 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$

6. ? is the determinant of  $\begin{pmatrix} 1 & -2 \\ 2 & -3 \end{pmatrix}$       A) 1      B) 0      C) -7      D) (1) (-3) (2) (-2)

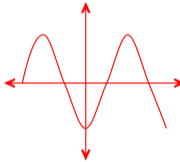
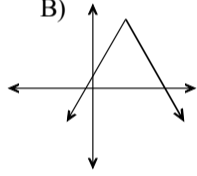
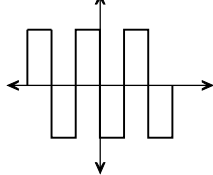
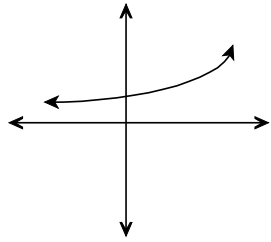
7. The "curved" graph equation which we have used to generate systems of equations is ? .

- A)  $y = ax + b$       B)  $y = mx + b$       C)  $z = ax + by + c$       D)  $y = ax^2 + bx + c$

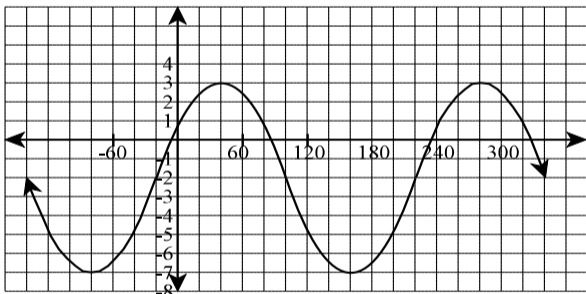
8. If (2, 5) is a point on a curved graph, then ? is the equation it will generate.

- A)  $4a + 2b + c = y$       B)  $5 = 4a + 2b + c$       C)  $y = 2x + 5$       D)  $0 = 2x + 5y$

9. ? is a graph which is sinusoidal.

- A)       B)       C)       D) 

USE THE FOLLOWING GRAPH FOR QUESTIONS 10, 11, and 12.



10 The period is ? degrees .

- A) 60      B) 120      C) 180      D) 240

11. The sinusoidal axis is ? .

- A)  $y = -7$       B)  $y = 3$       C) x-axis      D)  $y = -2$

12. ? is the amplitude.

- A) 10      B) 5      C) 3      D) -7

13. The function form of  $3(y - 2) = \cos x$  is ? .

- A)  $y = -3 \cos\left(x - \frac{1}{2}\right)$       B)  $y = \frac{1}{3} \cos(x + 2)$       C)  $y = \frac{1}{3} \cos x + 2$       D)  $y = 3 \cos x - 2$

14. The horizontal (x-axis) distance between consecutive maximums is a way to find ? .

- A) sinusoidal axis      B) period      C) amplitude      D) horizontal translation

15. The mapping notation for  $2(y + 3) = \cos \frac{1}{2}(x + 60)$  is ? .

- A)  $(x, y) \rightarrow (2x + 60, \frac{1}{2}y + 3)$       B)  $(x, y) \rightarrow (\frac{1}{2}y - 3, 2x - 60)$   
 C)  $(x, y) \rightarrow (2x - 60, \frac{1}{2}y - 3)$       D)  $(x, y) \rightarrow (-2x - 60, -\frac{1}{2}y - 3)$

16. On a **unit circle** , the "x-coordinate" is the ? of the angle of rotation.

- A) cosine      B) sine      C) tangent      D) A or B

17.  $\frac{?}{?}$  is co-terminal with  $10^\circ$ .

- A)  $80^\circ$                       B)  $-230^\circ$                       C)  $-80^\circ$                       D)  $730^\circ$

18. The conversion to degrees of  $\frac{-\pi}{2}$  is  $?$  degrees.

- A) -300                      B) -270                      C) -90                      D) none of these

19.  $\cos(150^\circ) = ?$ .

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

20. The conversion for  $\frac{5\pi}{9}$  is  $?$  degrees.

- A) 100                      B)  $\frac{\sqrt{2}}{2}$                       C) 200                      D)  $\frac{5(3.14)}{9}$

21.  $\theta = ?$  are the solution(s) for  $1 - 2 \sin \theta = 2, 0^\circ \leq \theta < 360^\circ$  (i.e. one revolution).

- A)  $210^\circ, 330^\circ$                       B)  $\frac{7\pi}{6}, \frac{11\pi}{6}$                       C)  $210^\circ + 360^\circ n, n \in \mathbb{Z}$                       D) no solution

22. When  $(\sec x)(\sin^2 x)(\cot^2 x)$  is simplified the result is  $?$ .

- A)  $\tan x$                       B)  $\sec \sin^2 \cot^2 x$                       C)  $\cos x$                       D) 1

23. The area of a triangle with sides of 4 cm, 8 cm, and an included angle of  $80^\circ$  is  $?$   $\text{cm}^2$ .

- A)  $(0.5)(4)(8)$                       B) 16.0                      C) 2.7                      D) 15.8

24. If we know the lengths of two legs (short sides) in a right triangle we can find the hypotenuse by using the  $?$ .

- A) area formula                      B) sine function  
C) law of sines                      D) law of cosines

25. A triangle has sides of length 7m, 10m, and 12 m. The smallest angle has a measure of  $?$  degrees.

- A) 36                      B) 56                      C) 88                      D) 21

26. The following is an example of a  $?$  sample:

A survey is given to all Regina students and is used to represent all students in grades 10 to 12 in Newfoundland..

- A) cluster                      B) convenience                      C) systematic                      D) self selected

27.  $?$  is the formula used to find a 95% confidence intervals for a sample of 20 with a mean of 10 and the standard deviation is 12.

- A)  $10 \pm (1.96) \frac{20}{\sqrt{10}}$                       B)  $10 \pm (1.96) \frac{12}{\sqrt{20}}$   
C)  $20 \pm (1.96) \frac{10}{\sqrt{12}}$                       D)  $12 = \frac{20}{\sqrt{10}}$

28. A sample of the I.Q.'s of people in a class found that the mean was 100 and the standard deviation was 10. An "approximate" 95% confidence interval is  $?$ .

- A) (75, 125)                      B) (90, 110)                      C) (80, 120)                      D) (84, 116)

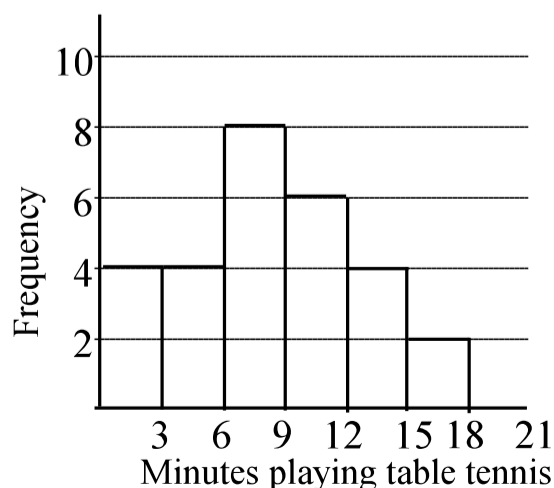
Use the following Graph for #29 and #30. The graph shows a sample of the number of people who play a certain number of minutes of table tennis each lunch time at Regina

29.  $?$  is the number of students sampled.

- A) 28                      B) 6  
C) 7                      C) 8

30.  $?$  is the percentage of people who play over 12 minutes.

- A) 14%                      B)  $\frac{6}{28}$   
C) 21%                      D)  $\frac{4}{28}$



Part II - Long Answer [70% total]

Show all necessary workings in the space provided

1. Describe each plane. (Do not graph it) [1 mark each]

a)  $6x = 12$

parallel to y and z axis  
x-int ( 2 , 0 , 0)

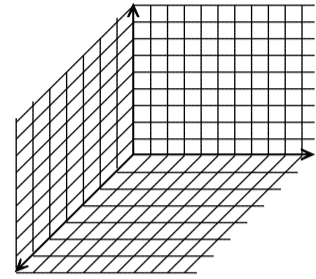
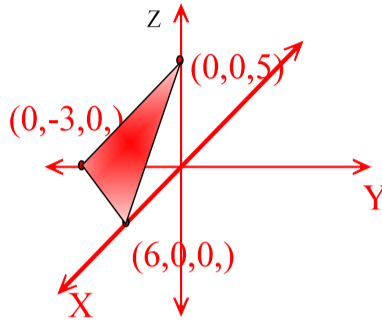
b)  $8x - 5y = -40z$

Passes through origin

2. Sketch each plane (use whichever grid you find most useful)

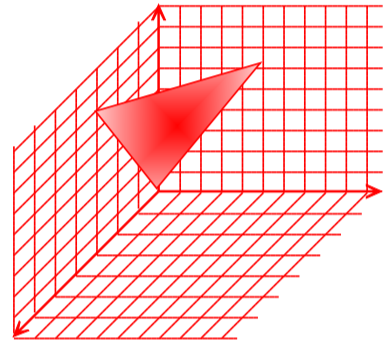
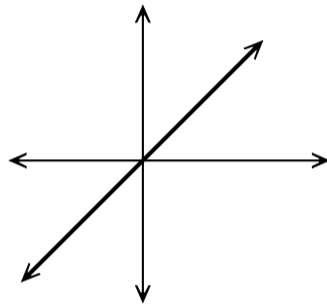
a)  $5x - 10y + 6z = 30$  [2 marks]

x: (6,0,0)  
y: (0,-3,0)  
z: (0,0,5)



b)  $2x + 3y - z = 0$  [2 marks]

all pass through (0,0,0) - x, y and z int.



3. a) What is the x-y trace of  $10x + 7y - 4z = 34$  ? [2 marks]

$10x + 7y = 34$

4. Solve each system .

a) use substitution, matrices, or elimination. [2 marks]

$$\begin{cases} 2x + y = 1 \\ x - y = 2 \end{cases}$$

too many possible ways . Solution is ( 1 , -1)

#4 continued

b) solve by using elimination or substitution.[3 marks]

$$\begin{cases} 2x + y + z = 7 \\ x - y + 3z = 8 \\ 3x - 2y + z = 2 \end{cases}$$

too many possible ways . Solution is ( 1 , 2 , 3)

5. A dog is jumping off a table through a hoop. Fluffy leaves the 1m high table, goes through a 3m high hoop that is 2m from the table and then lands on the ground 3 m from the table. [Hint: sketch the situation described]

a) i) the independent variable is: Hz. Dist. ii) the dependent variable is: Height

b) the three coordinates to be used in the "curved equation" are, [2 marks]

$(0, 1)$        $(2, 3)$        $(3, 0)$

c) If the point (4, -3) was substituted into the curved equation formula, what would be the equation that would be generated? [2 marks]

$$y = ax^2 + bx + c$$

$$\text{sub}(4, -3)$$

$$(-3) = a(4)^2 + b(4) + c$$

$$-3 = 16a + 4b + c$$

6. a) Put in FUNCTION FORM [1 mark]

$$\frac{1}{3}(y + 5) = \cos 7(x - 8)$$

$$(y + 5) = 3 \cos 7(x - 8)$$

$$y = 3 \cos 7(x - 8) - 5$$

b) Put in TRANSFORMATIONAL FORM [1 mark]

$$y = 2 \sin 4(x - 2) - 5$$

$$y + 5 = 2 \sin 4(x - 2)$$

$$\frac{1}{2}(y + 5) = \sin 4(x - 2)$$

7. Complete the mapping notation for each. [3 marks total]

i)  $-3(y + 2) = \sin \frac{3}{5}(x - 4)$

$$(x, y) \rightarrow \left( \frac{5}{3}x + 4, -\frac{1}{3}y - 2 \right)$$

ii)  $y = 2 \sin 3(x - 5) - 7$

[2 marks]

tran. form:  $\frac{1}{2}(y + 7) = \sin 3(x - 5)$

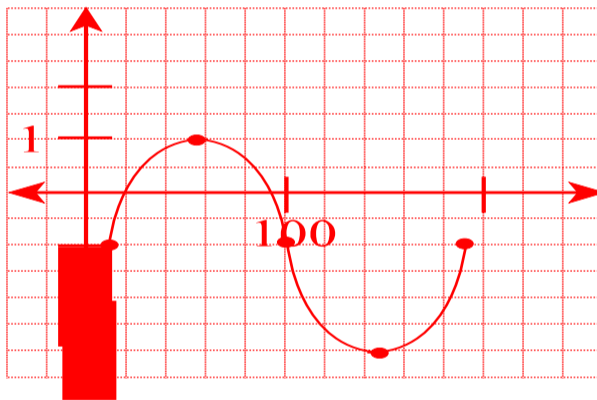
$$(x, y) \rightarrow \left( \frac{1}{3}x + 5, 2y - 7 \right)$$

8. Graph the following. [4 marks]

$$\frac{1}{2}(y + 1) = \sin 2(x - 10)$$

$$M.R.: (x, y) \rightarrow \left( \frac{1}{2}x + 10, 2y - 1 \right)$$

Orig T.O.V.		New T.O.V.	
X	Y	X	Y
0	0	10	-1
90	1	55	1
180	0	100	-1
270	-1	145	-3
360	0	190	-1



9. Find the equation in each of the following.

a) as a SINE or COSINE. [4 marks]

As cos from 10 to 130 (many more answers)

$$HS(P): 130 - 10 = 120 \text{ thus multiple} = 120/360 = 1/3$$

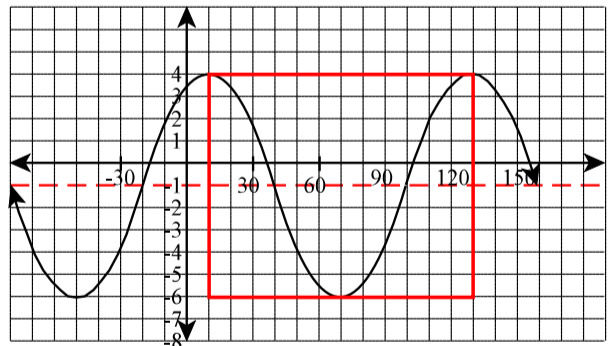
HT(H): 10

VS(A): 5

VT(S): -1

$$M.R.: (x, y) \rightarrow \left( \frac{1}{3}x + 10, 5y - 1 \right)$$

$$eq: \frac{1}{5}(y + 1) = \cos 3(x - 10)$$



b) Find the equation that relates the height of a beach ball and time. A bouncing beach ball (that continues to bounce, over and over) is at a maximum height of 8 m, 3s after a sunbather notices it. The ball is half way to the ground 2s later (i.e. 2 s after it has reached a maximum height). [4 marks]

As cos from 3 to 11 (other answers)

$$HS(P): 11 - 3 = 8 \text{ thus multiple} = 8/360 = 1/45$$

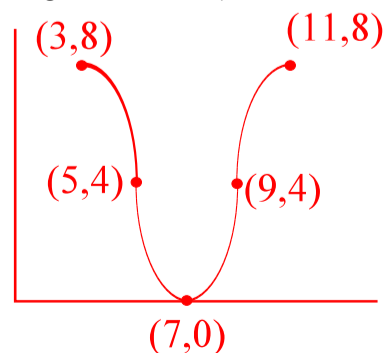
HT(H): 3

VS(A): 4

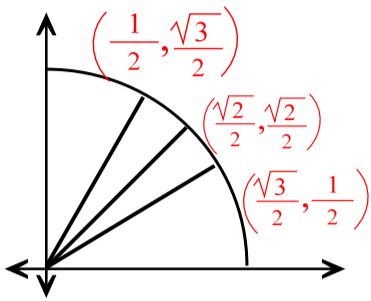
VT(S): 4

$$M.R.: (x, y) \rightarrow \left( \frac{1}{45}x + 3, 4y + 4 \right)$$

$$eq: \frac{1}{4}(y - 4) = \cos 45(x - 3)$$

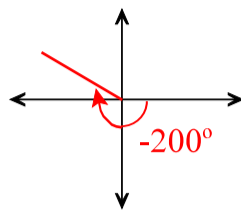


10. Fill in the EXACT coordinates of first quadrant of the unit circle. [2 marks]

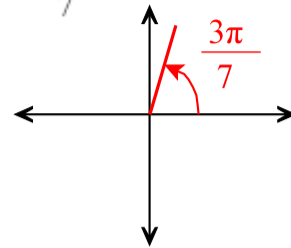


11. Sketch each angle in standard position. [1 mark each]

a)  $-200^\circ$



b)  $\frac{3\pi}{7}$



12. a) Find one positive co-terminal angle. [1 mark] b) Find one negative co-terminal angle. [1 mark]

230°  
 $230^\circ - 360^\circ = -130^\circ$   
 $230^\circ + 360^\circ = 590^\circ$

$$\frac{11\pi}{6}$$

$$\frac{11\pi}{6} - 2\pi = \frac{11\pi}{6} - \frac{12\pi}{6} = \frac{-\pi}{6}$$

$$\frac{11\pi}{6} + 2\pi = \frac{11\pi}{6} + \frac{12\pi}{6} = \frac{23\pi}{6}$$

13. Find the EXACT value of each.

a)  $\frac{\sin 210^\circ}{\cos^2 45^\circ}$

$$= \frac{-1}{\left(\frac{\sqrt{2}}{2}\right)^2} = \frac{-1}{\frac{2}{4}} = \frac{-1}{\frac{1}{2}} = -2$$

b)  $\cos(-180^\circ) + \sin 45^\circ$

$$= -1 + \frac{\sqrt{2}}{2} = \frac{-2 + \sqrt{2}}{2}$$

14. Prove:

$$\csc \theta (\sin \theta + \cos \theta) = 1 + \cot \theta$$

let  $c = \cos \theta$  and  $s = \sin \theta$

$$\frac{1}{s}(s+c) = 1 + \frac{c}{s}$$

$$\frac{s}{s} + \frac{c}{s} = 1 + \frac{c}{s}$$

$$1 + \frac{c}{s} = 1 + \frac{c}{s}$$

15. Find ALL solutions (in degrees) for

$$4\sin \theta + 3 = 0$$

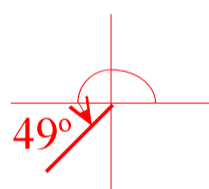
$$4\sin \theta = -3$$

$$\sin \theta = \frac{-3}{4}$$

$$\sin R = \frac{3}{4}$$

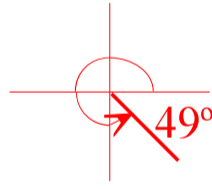
$$\sin R = 0.75$$

$$R = 49^\circ$$



$$\theta = 180^\circ + 49^\circ$$

$$\theta = 229^\circ$$



$$\theta = 360^\circ - 49^\circ$$

$$\theta = 311^\circ$$

$$\theta = \begin{cases} 229^\circ + 360^\circ n \\ 311^\circ + 360^\circ n \end{cases} \quad n \in I$$

16. Do each of the following. [10 marks total]

a) Find the area of a triangular dog pen if two of the fence sections are 8 m and 10 m long and form an angle of  $88^\circ$ .

$$\text{area} = \frac{1}{2} (8)(10) \sin 88^\circ$$

$$\text{area} = (0.5)(8)(10)(0.9994)$$

$$\text{area} = 40.0 \text{ m}^2$$

b) Find the length of side "d" in the following triangle.

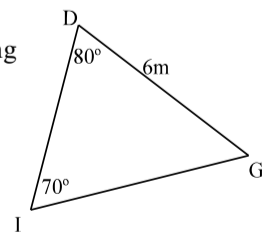
$$\frac{d}{\sin D} = \frac{i}{\sin I} = \frac{g}{\sin G}$$

$$\frac{d}{\sin 80^\circ} = \frac{6}{\sin 70^\circ} = \frac{g}{\sin G}$$

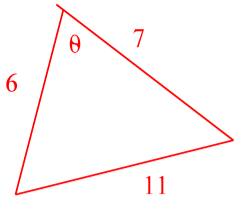
$$\frac{d}{\sin 80^\circ} = \frac{6}{\sin 70^\circ}$$

$$\frac{d}{0.9848} = \frac{6}{0.9379}$$

$$d = 6.3 \text{ m}$$



c) Find the measure of the angle across from the largest side of a triangle with side lengths of 6 cm, 7 cm, and 11 cm. [4 marks]



$$11^2 = 6^2 + 7^2 - 2(6)(7) \cos \theta$$

$$121 = 36 + 49 - 84 \cos \theta$$

$$\frac{121 - 36 - 49}{-84} = \cos \theta$$

$$-0.4286 = \cos \theta$$

$$115^\circ = \theta$$

17. A set of sample data is { 2, 5, 11 }.

$$\bar{X} = \frac{2 + 5 + 11}{3} = 6$$

deviations

$$6 - 2 = 4$$

$$6 - 5 = 1$$

$$6 - 11 = -5$$

squared deviations

$$(4)^2 = 16$$

$$(1)^2 = 1$$

$$(-5)^2 = 25$$

average of squared deviations

$$\frac{16 + 1 + 25}{3 - 1}$$

$$= \frac{42}{2}$$

$$= 21$$

Sample standard deviation(Sx)

$$S_x = \sqrt{21} = 4.6$$

18. a) Mr. Matthews wanted to borrow some money because he was retiring. He sampled 16 students in his home room and found that they had an average of \$8.35 in their pocket with a standard deviation of \$4.20. What is a 90% confidence interval for his home room?

$$\bar{x} = 8.35$$

$$S_x = 4.20$$

$$n = 16$$

$$90\% \rightarrow z = 1.645$$

$$\left( \bar{X} \pm z \frac{S_x}{\sqrt{n}} \right)$$

$$= \left( 8.36 \pm 1.645 \frac{4.20}{\sqrt{16}} \right)$$

$$= \left( 8.36 \pm 1.645 \frac{4.20}{4} \right)$$

$$= (8.36 \pm 1.645(1.05))$$

$$= (8.36 \pm 1.73)$$

$$= (8.36 - 1.73, 8.36 + 1.73)$$

$$= (6.63, 10.09)$$

b) What does this confidence interval mean? [1 mark]

I am 90% confident that the range of money from \$6.63 to \$10.09, will capture the average amount of change of all students (the population mean).