Use the following schedule to complete the final exam review.

Homework will be checked in every day.

Late work will NOT be accepted.

Homework answers will be provided at the beginning of each class period for you to check your work from the previous night.

**FINAL EXAM SCHEDULE:**

The first exam each day begins **promptly** at 8:00 a.m.

- Friday, May 29th: 6th & 7th hour exams [90 min each]
- Monday, June 1st: 4th & 5th hour exams [90 min each]
- Tuesday, June 2nd: 2nd & 3rd hour exams [90 min each]
- Wednesday, June 3rd: 1st hour exam [90 min]

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Assignment</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fri.</td>
<td>May 15, 2015</td>
<td>Trig Part 1 #1-23 odds, 25-30 all</td>
<td></td>
</tr>
<tr>
<td>Mon.</td>
<td>May 18, 2015</td>
<td>Trig Part 1 #31-37 all</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trig Part 2 #1-11, odds, 13-15 all</td>
<td></td>
</tr>
<tr>
<td>Tues.</td>
<td>May 19, 2015</td>
<td>Trig Part 2 #16-27 all, 29-31 odds</td>
<td></td>
</tr>
<tr>
<td>Wed.</td>
<td>May 20, 2015</td>
<td>Trig Part 3 #1-11 all, 12-18 evens</td>
<td></td>
</tr>
<tr>
<td>Thurs.</td>
<td>May 21, 2015</td>
<td>Exponential/Logs #1-19 all</td>
<td></td>
</tr>
<tr>
<td>Fri.</td>
<td>May 22, 2015</td>
<td>Look back to review previous assignments</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Begin making Note Card</td>
<td></td>
</tr>
<tr>
<td>Wed.</td>
<td>May 27, 2015</td>
<td>Vectors #2-20 evens, 21-23 all</td>
<td></td>
</tr>
<tr>
<td>Thurs.</td>
<td>May 28, 2015</td>
<td>Matrices #2-16 evens, 19, 20</td>
<td></td>
</tr>
</tbody>
</table>
Trig Part 1 - SOH CAH TOA, Special Rt Triangles, & Unit Circle

Fill in the ratios for each trig function using the letters for opposite (O), adjacent(A) and hypotenuse(H)

\[
\begin{align*}
\sin &= \quad \cos &= \\
\tan &= \quad \csc &= \\
\sec &= \quad \cot &= \\
\end{align*}
\]

Find each value. No decimals – reduce fractions.

1. \( \sin D \)  
2. \( \sin E \)  
3. \( \cot E \)  
4. \( \tan D \)
5. \( \cos D \)  
6. \( \csc D \)  
7. \( \sec D \)  
8. \( \cot D \)
9. \( \cos E \)  
10. \( \tan E \)  
11. \( \sec E \)  
12. \( \csc E \)

Using the 30-60-90 and 45-45-90 rules, find each length or angle measure. Express all lengths in simplest radical form.

13. \( AB = _____ \) \( BC = _____ \)  
14. \( PM = _____ \) \( MN = _____ \)  
15. \( AC = _____ \) \( AB = _____ \)  
16. \( ST = _____ \) \( TV = _____ \)

Fill in the missing sides of the special right triangles and answer the following questions. Exact answers only

17. \( \sin 30^\circ = \) 
18. \( \sin 60^\circ = \) 
19. \( \sin 45^\circ = \) 
20. Use a calculator to find each value. Round to the nearest 100th.

17. \( \cos 30^\circ = \) 
18. \( \cos 60^\circ = \) 
19. \( \cos 45^\circ = \) 
20. \( \tan 30^\circ = \) \( \cos 30^\circ = \) \( \tan 30^\circ = \)  
21. \( \sin 60^\circ = \) 
22. \( \cos 45^\circ = \) 
23. \( \sin 45^\circ = \) 
20. \( \tan 45^\circ = \)

Use SOH CAH TOA to solve for the following parts of the right triangles. \( C \) is a right angle.

21. \( c = 20, \ a = 15 \), find \( b \)  
22. \( a = 30, \ b = 12 \), find \( A \)  
23. \( A = 35^\circ, \ c = 9 \), find \( b \)  
24. \( a = 6, \ b = 12 \), find \( B \)
Use **SOH CAH TOA** to solve each story problem

25. Katlyn leans a 16 foot ladder against the wall. If the ladder makes an angle of 70° with the ground, how far up the wall does the ladder reach?

26. Tom leans a 20-ft ladder against a wall. The base of the ladder is 4 feet from the wall. What angle \( \theta \) does the ladder make with the ground?

---

**Find the reference angle for each.**

<table>
<thead>
<tr>
<th>27. 27°</th>
<th>28. 132°</th>
<th>29. 209°</th>
<th>30. 289°</th>
</tr>
</thead>
</table>

31. Find the value of \( n \) to the nearest degree.

[A] 53°  
[B] 90°  
[C] 45°  
[D] 37°  
[E] None of the above

32. A school flagpole casts a 16-foot shadow on the lawn. A teacher stood at the shadow's edge and measured the angle of elevation to the top of the pole at 42°. How tall is the pole?

[A] 12 ft  
[B] 5.6 ft  
[C] 17.8 ft  
[D] 14.4 ft  
[E] None of the above

33. Find the value of \( j \) rounded to the nearest tenth.

[A] 663.4  
[B] 197.1  
[C] 49.3  
[D] 13.2  
[E] None of the above

34. Change \( \frac{4\pi}{3} \) to degrees.

[A] 45°  
[B] 180°  
[C] 250°  
[D] 290°  
[E] None of the above

35. Determine the exact value of \( \sin 150° \).

[A] \( \frac{1}{2} \)  
[B] \( -\frac{1}{2} \)  
[C] \( \frac{\sqrt{3}}{2} \)  
[D] \( -\frac{\sqrt{3}}{2} \)  
[E] None of the above

36. Find the exact value of \( \sec \frac{2\pi}{3} \).

[A] \( -\frac{2\sqrt{3}}{3} \)  
[B] \( -\frac{1}{2} \)  
[C] \( \frac{2\sqrt{3}}{3} \)  
[D] \( -2 \)  
[E] None of the above

37. Point \( P(0.8, 0.6) \) is located on a unit circle. Find \( \sin \theta \) and \( \cos \theta \).

[A] \( \sin \theta = 0.6, \cos \theta = 0.8 \)  
[B] \( \sin \theta = 0, \cos \theta = 1 \)  
[C] \( \sin \theta = 0.8, \cos \theta = 0.6 \)  
[D] \( \sin \theta = 1, \cos \theta = 0 \)
Trig Part 2 - More Unit Circle, Graphs, Identities, and Formulas

<table>
<thead>
<tr>
<th>Convert from degrees to radians</th>
<th>Convert from radians to degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $45^\circ$</td>
<td>2. $-60^\circ$</td>
</tr>
<tr>
<td>3. $\frac{\pi}{5}$</td>
<td>4. $\frac{3\pi}{4}$</td>
</tr>
</tbody>
</table>

**Complete the following.**

90° Family

<table>
<thead>
<tr>
<th>Sin 90°</th>
<th>Cos 90°</th>
<th>Tan 90°</th>
<th>Sin 270°</th>
<th>Cos 270°</th>
<th>Tan 270°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Csc 90°</td>
<td>Sec 90°</td>
<td>Cot 90°</td>
<td>Csc 270°</td>
<td>Sec 270°</td>
<td>Cot 270°</td>
</tr>
<tr>
<td>Sin 180°</td>
<td>Cos 180°</td>
<td>Tan 180°</td>
<td>Sin 360°</td>
<td>Cos 360°</td>
<td>Tan 360°</td>
</tr>
<tr>
<td>Csc 180°</td>
<td>Sec 180°</td>
<td>Cot 180°</td>
<td>Csc 360°</td>
<td>Sec 360°</td>
<td>Cot 360°</td>
</tr>
</tbody>
</table>

**Give the exact value for each problem.** $0 < \theta \leq 360$

5. $\sin \theta = -\frac{\sqrt{3}}{2}$  
6. $\cos \theta = -\frac{1}{2}$  
7. $\sec \theta = \text{undefined}$  
8. $\sin \theta = -\frac{\sqrt{2}}{2}$

**Draw a triangle for each problem and find the exact value – no decimals!!**

9. Find $\sin \theta$, if $\cot \theta = \frac{3}{4}$ and $0 < \theta < 90^\circ$  
10. Find $\sec \theta$ if $\sin \theta = \frac{1}{3}$ and $90^\circ < \theta < 180^\circ$  
11. Find $\cos \theta$, if $\tan \theta = \frac{8}{15}$ and the angle is in the third quadrant  
12. Find $\cot \theta$, if $\csc \theta = -5$ and $270^\circ < \theta < 360^\circ$

**Tell which quadrant each angle lies in. (I, II, III, or IV)**

13. $\cos \theta$ is positive and $\tan \theta$ is negative.  
14. $\csc \theta$ is positive and $\tan \theta$ is negative.  
15. $\tan \theta$ is positive and $\sec \theta$ is negative.
Give the amplitude, period and phase shifts (up/down/left/right) of each graph – you do not need to graph these.

<table>
<thead>
<tr>
<th>Equation</th>
<th>Amplitude</th>
<th>Period</th>
<th>h (left or right)</th>
<th>k (up or down)</th>
<th>Reflection?</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = 2 \sin(\theta - 180^\circ) + 1$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = -3 \cos \theta - 4$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = \frac{1}{2} \sin(\theta + 90^\circ)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Directions: Graph one period of the following trigonometric equations.

<table>
<thead>
<tr>
<th>Equation</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = 4 \sin x$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = \cos(x + 180^\circ)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = -2 \cos \theta$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = -\sin \theta - 2$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = \sin(\theta - 90^\circ)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = \cos \theta - 2$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = 3 \cos \theta + 1$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Use your formula sheet to remind yourself of the trig identities.

**Simplify. Show all work.**

<table>
<thead>
<tr>
<th>26.</th>
<th>27.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{\tan \theta \csc \theta}{\sec \theta} )</td>
<td>( \frac{\sin^2 \theta - \cot \theta \tan \theta}{\cot \theta \sin \theta} )</td>
</tr>
</tbody>
</table>

Use your formula sheet to remind yourself of the sum and difference formulas.

**Use the sum and difference formulas to find the EXACT value of each trig. function. Rationalize when necessary!**

<table>
<thead>
<tr>
<th>28.</th>
<th>29.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \cos 255^\circ )</td>
<td>( \sin 285^\circ )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>30.</th>
<th>31.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \tan 15^\circ )</td>
<td>( \cos 195^\circ )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>32.</th>
<th>33.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \sin 105^\circ )</td>
<td>( \tan 285^\circ )</td>
</tr>
</tbody>
</table>
### Law of Sines
\[
\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}
\]

### Law of Cosines
\[
a^2 = b^2 + c^2 - 2bc \cos A
\]

#### Determine whether to use the Law of Sines or the Law of Cosines to solve the given triangles. Circle one. You do NOT need to solve!

<table>
<thead>
<tr>
<th>Number</th>
<th>Diagram</th>
<th>Sines</th>
<th>Cosines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td><img src="image3.png" alt="Diagram" /></td>
<td><img src="image4.png" alt="Diagram" /></td>
<td></td>
</tr>
</tbody>
</table>

#### Use the Law of Sines and/or the Law of Cosines to solve each triangle. Round all decimals to the nearest 100th.

<table>
<thead>
<tr>
<th>Number</th>
<th>Diagram</th>
<th>Measurements</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td><img src="image5.png" alt="Diagram" /></td>
<td>(A = 10), (B = 82^\circ), (C = 7)</td>
<td>(\angle A = ___, \angle B = ___, \angle C = ___, (b = ____)</td>
</tr>
<tr>
<td>4.</td>
<td><img src="image6.png" alt="Diagram" /></td>
<td>(A = 17), (B = 21), (C = 26)</td>
<td>(\angle A = ___, \angle B = ___, \angle C = ___, (a = ___)</td>
</tr>
<tr>
<td>5.</td>
<td>(\angle A = 32.2^\circ), (b = 21.3), (a = 34.5)</td>
<td>(\angle B = ___, \angle C = ___, (c = ___)</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>(\angle A = 127^\circ), (b = 32), (c = 25)</td>
<td>(\angle B = ___, \angle C = ___, (a = ___)</td>
<td></td>
</tr>
</tbody>
</table>
7. An isosceles triangle has a base of 22 cm and a vertex angle of 36°. Find the perimeter of the triangle.

8. In \( \triangle ABC \), \( A = 32^\circ \), \( a = 8 \), and \( b = 7 \). Find \( C \).

9. Find the length of side \( a \) to the nearest tenth.

10. Solve \( \sin^{-1} \frac{\sqrt{7}}{2} = \theta \) (Recall restricted domain!)

11. Solve \( \cos \theta = -\frac{\sqrt{2}}{2} \)
Solve the following given that $0^\circ \leq \theta \leq 360^\circ$. The number of solutions you should find is given in parentheses.

<table>
<thead>
<tr>
<th>Equation</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. $2 \tan \theta \sin \theta - 2 \sin \theta = 0$</td>
<td>5 solutions</td>
</tr>
<tr>
<td>13. $2 \cos^2 \theta - \sqrt{3} \cos \theta = 0$</td>
<td>4 solutions</td>
</tr>
<tr>
<td>14. $\sin^2 \theta - \sin \theta = 2$</td>
<td>1 solution</td>
</tr>
<tr>
<td>15. $2 \cos \theta + 1 = 0$</td>
<td>2 solutions</td>
</tr>
<tr>
<td>16. $2 \tan^2 \theta - 5 \tan \theta + 3 = 0$</td>
<td>4 solutions</td>
</tr>
<tr>
<td>17. $2 \cos^2 \theta = \cos \theta$</td>
<td>4 solutions</td>
</tr>
</tbody>
</table>

Use your formula sheet to find the area of the given triangle. Draw the triangle and then decide if you can find the area, or if you have to use the Law of Sines or the Law of Cosines to find more information. Label your triangle as you find additional information.

<table>
<thead>
<tr>
<th>Triangle Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>18. $A = 105^\circ, b = 12, c = 24$</td>
</tr>
<tr>
<td>19. $B = 102^\circ, C = 27^\circ, a = 8.5$</td>
</tr>
<tr>
<td>20. $a = 32, b = 24, c = 36$</td>
</tr>
</tbody>
</table>
Exponential Functions & Logs

Determine which of the following functions are exponential growth and which are exponential decay. Circle your answer.

1. \( y = 1.2^x \)  \text{GROWTH DECAY}  
2. \( y = 8(0.35)^x \)  \text{GROWTH DECAY}

Graph the given exponential function using the following domain for : \([-2, 2]\). State whether the graph shows exponential growth or decay.

3. \( y = 2^x \)  
4. \( y = \frac{1^x}{2} \)

Rewrite each equation in its exponential form.

5. \( \log_5 \frac{1}{25} = -2 \)  
6. \( \log 1000 = 3 \)  
7. \( \log_4 1024 = 5 \)  
8. \( \ln e^{-6} = -6 \)

Rewrite each equation in its logarithmic form.

9. \( 8^3 = 512 \)  
10. \( 121^{-\frac{1}{2}} = \frac{1}{11} \)

Solve.

11. \( \log_x 4 = \frac{1}{3} \)  
12. \( \log_6 216 = x \)  
13. \( \log_3 \frac{1}{81} = x \)  
14. \( \ln e^5 = x \)
For the following application problems, show the equation (if one hasn’t already been given to you) and show the substitution of all the variables necessary to solve.

15. Kristin starts an experiment with 2,300 bacteria cells. The formula \( A = 2,300(1.14)^t \) can be used to approximate the number of bacteria cells after \( t \) hours. How many bacteria cells can be expected in the sample after 12 hours?

16. An investment pays 3.8% interest compounded monthly. If $15,750 is invested in the account, what will be the balance after 15 years?

17. You’re off to college! You buy a computer for $1400. The value of the computer can be modeled by the equation \( V(t) = 1400(.85)^t \). What will be the value of the computer in 4 years?

18. A college savings account pays 5.3% interest compounded continuously. What is the balance of an account after 18 years if $20,000 was initially deposited?

19. Freedom National Bank offers several types of savings accounts with different interest rates and compounding periods.

**Money-Market Account:** Earns 2.8% interest, compounded quarterly.

**Standard Savings Account:** Earns 3.35% interest compounded monthly.

**All-in-One Account:** Earns 3.2% interest compounded continuously.

You have $2000 to deposit and plan to leave it in the account for 10 years. Which account is the best investment for your money?

<table>
<thead>
<tr>
<th>Money Market Account</th>
<th>Standard Savings Account</th>
<th>All-in-One Account</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Vectors

Draw the vector from $P_1$ to $P_2$. Then find the vector in component form with the initial point $P_1$ and terminal point $P_2$. Finally, draw the vector in component form.

1. $P_1 (-2, 1)$ and $P_2 (5, -6)$
2. $P_1 (6, -1)$ and $P_2 (4, 3)$

Find the magnitude and direction for the given vector. Draw the vector to help decide the direction! Estimate the magnitude to the nearest tenth. Estimate the direction to the nearest tenth of a degree.

3. $\mathbf{v} = \langle 5, -12 \rangle$
4. $\mathbf{v} = \langle -4, -7 \rangle$
Given \( \mathbf{u} = \langle -4, 9 \rangle \), \( \mathbf{v} = \langle -2, -5 \rangle \) and \( \mathbf{w} = \langle 7, 0 \rangle \). Find the following.

5. \( \| \mathbf{u} \| \)
6. \( \| \mathbf{v} \| \)
7. \( \| \mathbf{u} + \mathbf{v} \| \)

6.)
7.)

8. \( \| \mathbf{v} + \mathbf{w} \| \)
9. \( -5 \mathbf{v} \)
10. \( 2 \mathbf{w} - 3 \mathbf{v} \)

8.)
9.)
10.)

11. \( \frac{1}{2} \mathbf{w} + 5 \mathbf{u} \)
12. \( \| 3 \mathbf{w} - 4 \mathbf{v} \| \)

11.)
12.)

Find the unit vector in the direction \( \mathbf{v} \) of by dividing each component of \( \mathbf{v} \) by the magnitude of \( \mathbf{v} \).

13. \( \mathbf{v} = \langle 8, -6 \rangle \)
14. \( \mathbf{v} = \langle 15, -8 \rangle \)

13.)
14.)
Given \( \mathbf{v} = 4i - j \) and \( \mathbf{u} = -6i + 5j \), find the following:

15. \( 2\mathbf{u} - 3\mathbf{v} \)

16. \(-5\mathbf{v}\)

17. \(||\mathbf{v}||\)

18. \(\mathbf{u} + 2\mathbf{v}\)

19. \(||\mathbf{u} + 2\mathbf{v}||\)

20. \(\frac{1}{2}\mathbf{v} - \frac{1}{2}\mathbf{u}\)

Draw vectors \( \mathbf{u} \) and \( \mathbf{v} \) on the same coordinate plane. Then, find the dot product of \( \mathbf{u} \) and \( \mathbf{v} \), \( ||\mathbf{u}|| \) and \( ||\mathbf{v}|| \). Finally, find the measure of the angle between the two vectors.

21. \( \mathbf{u} = \langle 4, -9 \rangle; \mathbf{v} = \langle 2, 6 \rangle \)

22. \( \mathbf{u} = -3i + 2j; \mathbf{v} = -6i - 9j \)

23. \( \mathbf{u} = \langle 1, 2 \rangle; \mathbf{v} = \langle -3, 7 \rangle \)

\( \mathbf{u} \cdot \mathbf{v} = \)

\( ||\mathbf{u}|| = \)

\( ||\mathbf{v}|| = \)

\( \mathbf{u} \cdot \mathbf{v} = \)

\( ||\mathbf{u}|| = \)

\( ||\mathbf{v}|| = \)

Angle between two vectors =

Angle between two vectors =

Angle between two vectors =
# Systems and Matrices

Solve each system by hand. State which method you used: Substitution or Elimination.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>( y = 40x + 20 )</td>
<td>( y = -10x - 30 )</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>( 6x + 3y = 6 )</td>
<td>( 8x + 5y = 12 )</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>( 2x - 3y = -2 )</td>
<td>( 2x + y = 24 )</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>( 4x - 10 = y )</td>
<td>( 2x = 12 - 3y )</td>
<td></td>
</tr>
</tbody>
</table>

(____, ____)

Method = _______________

(____, ____)

Method = _______________

(____, ____)

Method = _______________

(____, ____)

Method = _______________

State the dimensions of each matrix.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 5. | \[
\begin{bmatrix}
5 & 0 \\
0 & 5 \\
5 & 0
\end{bmatrix}
\] |   |   |
| 6. | \[
\begin{bmatrix}
2 & -5 & 3 \\
1 & -4 & 6
\end{bmatrix}
\] |   |   |
| 7. | \[
\begin{bmatrix}
1 \\
2 \\
3
\end{bmatrix}
\] |   |   |
| 8. | \[
\begin{bmatrix}
4 & 5 & -6
\end{bmatrix}
\] |   |   |

For #9–#10, use the matrices below.

\( R = \[
\begin{bmatrix}
3 & -5 \\
-2 & -2
\end{bmatrix}
\] \quad S = \[
\begin{bmatrix}
-1 & 9 \\
4 & 2
\end{bmatrix}
\]

\( C = \[
\begin{bmatrix}
1 & -5 \\
-2 & 2
\end{bmatrix}
\] \quad D = \[
\begin{bmatrix}
0 & 4 & -3 \\
6 & 1 & 5
\end{bmatrix}
\]

9. \( R + S \) \quad 10. \( 2R - 3S \) \quad 11. \( CD \) \quad 12. \( DC \)
Use the following matrices for the multiplication problems:

\[ A = \begin{bmatrix} 1 & -2 \\ 12 & 10 \end{bmatrix}, \quad B = \begin{bmatrix} -13 & 6 \\ 15 & -1 \end{bmatrix}, \quad G = \begin{bmatrix} 0 & 11 & -12 \\ 6 & 1 & 5 \\ -3 & 4 & 5 \end{bmatrix}, \quad H = \begin{bmatrix} -2 & -5 & 10 \\ -4 & 0 & 1 \\ 22 & -33 & 11 \end{bmatrix} \]

13. \( AB \)

14. \( BA \)

15. \( GH \)

16. What are the dimensions of the product matrix when the following two matrices are multiplied: \(5 \times 2 \cdot 2 \times 3\)?

17. Find the inverse of matrix \( J = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix} \) using your calculator.

18. Find the inverse of matrix \( K = \begin{bmatrix} -2 & 3 \\ 5 & -1 \end{bmatrix} \) using your calculator.

Use the inverse matrix and matrix multiplication to solve the following systems. Start by filling in the Coefficient, Variable and Constant matrices. Remember to write your answer as an ordered pair or ordered triple.

19. \( 3x - 2y = 7 \\
7x + 3y = -1 \)

\[ AX = B \]

\[ \begin{bmatrix} \quad \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix} = \begin{bmatrix} \quad \end{bmatrix} \]

\[ A^{-1}B = \begin{bmatrix} \quad \end{bmatrix} \]

\((____, ____))\)

20. \( 2x - y + 2z = 15 \\
-x + y + z = 3 \\
3x - y + 2z = 18 \)

\[ AX = B \]

\[ \begin{bmatrix} \quad \end{bmatrix} \begin{bmatrix} \quad \end{bmatrix} = \begin{bmatrix} \quad \end{bmatrix} \]

\[ A^{-1}B = \begin{bmatrix} \quad \end{bmatrix} \]

\((____, ____ , ____))\)