1. **Question Details**

List the elements of the given set that are natural numbers, integers, rational numbers, and irrational numbers. (Enter your answers as comma-separated lists.)

\[ \{0, -15, 20, 25, 1, \frac{22}{7}, 0.538, \sqrt{5}, \pi, -\frac{1}{3}, \sqrt{2} \} \]

(a) natural numbers

(b) integers

(c) rational numbers

(d) irrational numbers

2. **Question Details**

Find the indicated set if given the following.

\[ A = \{x|x \geq -8\} \quad B = \{x|x < 5\} \quad C = \{x|-1 < x \leq 6\} \]

(a) \( A \cap C \)

\[ \{x|-8 \leq x < 5\} \]

\[ \{x|-8 \leq x \leq 5\} \]

\[ \{x|-1 < x \leq 6\} \]

\[ \{x|-1 \leq x \leq 6\} \]

none of these

(b) \( A \cap B \)

\[ \{x|-8 \leq x < 5\} \]

\[ \{x|-8 \leq x \leq 5\} \]

\[ \{x|-1 < x \leq 6\} \]

\[ \{x|-1 \leq x \leq 6\} \]

none of these
3. Question Details SPreCalc6 1.2.049. [1700549]

Simplify the expression and eliminate any negative exponent(s).

(a) \( \frac{6a^5b^{-3}}{2a^{-7}b^9} \)

(b) \( \left( \frac{y}{2x^{-2}} \right)^{-3} \)

4. Question Details sprecalc6 1.3.071.nva [1614234]

Factor the trinomial.

\( 3x^2 - 25x + 42 \)

5. Question Details sprecalc6 1.3.073.mi.nva [1615934]

Factor the trinomial.

\( (2x + 3)^2 + 6(2x + 3) + 8 \)

6. Question Details SPreCalc6 1.3.076. [1701555]

Use a Special Factoring Formula to factor the expression.

\( (x + 5)^2 - 16 \)

7. Question Details SPreCalc6 1.3.085. [1615401]

Factor the expression by grouping terms.

\( 2x^3 + 7x^2 - 6x - 21 \)

8. Question Details sprecalc6 1.4.010.mi.nva [1703993]

Find the domain of the expression.

\( \frac{1}{\sqrt{x - 1}} \)

- \( x \geq 1 \)
- \( x > 1 \)
- \( x < 1 \)
- \( x \leq 0 \)
- all real numbers
Perform the addition or subtraction and simplify. (Give your answer in factored form.)
\[ \frac{1}{x + 9} + \frac{5}{x - 8} \]

Solve the equation by factoring.
\[ 6x(x - 1) = 25 - 11x \]
\[ x = \] (smaller value)
\[ x = \] (larger value)

Evaluate the function at the indicated values. (If an answer is undefined, enter UNDEFINED.)
\[ f(x) = x^2 - 6 \]
\[ f(-3) = \]
\[ f(3) = \]
\[ f(0) = \]
\[ f\left(\frac{1}{2}\right) = \]
\[ f(10) = \]

Evaluate the function at the indicated values. (If an answer is undefined, enter UNDEFINED.)
\[ f(x) = 6x^2 + 2x - 12 \]
\[ f(0) = \]
\[ f(2) = \]
\[ f(-2) = \]
\[ f\left(\frac{\sqrt{2}}{2}\right) = \]
\[ f(x + 1) = \]
\[ f(-x) = \]
13. Question Details

Evaluate the piecewise defined function at the indicated values.

\[ f(x) = \begin{cases} 
  x^2 & \text{if } x < 0 \\
  x + 3 & \text{if } x \geq 0 
\end{cases} \]

- \[ f(-4) = \]
- \[ f(-3) = \]
- \[ f(0) = \]
- \[ f(3) = \]
- \[ f(4) = \]

---

14. Question Details

Use the Vertical Line Test to determine whether the curve is the graph of a function of \( x \).

(a)  
[Graph of a function]
- is a function
- is not a function

(b)  
[Graph of a function]
- is a function
- is not a function

(c)  
[Graph of a function]
- is a function
- is not a function

(d)  
[Graph of a function]
- is a function
- is not a function
Consider the following graph.

Use the Vertical Line Test to determine whether the curve is the graph of a function of $x$.

- Yes, the curve is a function of $x$.
- No, the curve is not a function of $x$.

If the curve is a function, state the domain and range. (Enter your answers using interval notation. If the curve is not a function enter NONE.)

Domain

Range
Consider the following graph.

Use the Vertical Line Test to determine whether the curve is the graph of a function of $x$.

- Yes, the curve is a function of $x$.
- No, the curve is not a function of $x$.

If the curve is a function, state the domain and range. (Enter your answers using interval notation. If the curve is not a function enter NONE.)

Domain: 

Range: 

---

17. Determine whether the equation defines $y$ as a function of $x$. (See Example 9.)

\[ x^2 + (y - 3)^2 = 8 \]

- is a function
- is not a function

---

18. Determine whether the equation defines $y$ as a function of $x$. (See Example 9.)

\[ x^2y + y = 2 \]

- is a function
- is not a function

---

19. Fill in the blank with the appropriate axis ($x$-axis or $y$-axis).

(a) The graph of $y = -f(x)$ is obtained from the graph of $y = f(x)$ by reflecting in the ____-Select____.

(b) The graph of $y = f(-x)$ is obtained from the graph of $y = f(x)$ by reflecting in the ____-Select____.
20. Suppose the graph of \( f \) is given. Describe how the graph of each function can be obtained from the graph of \( f \).

(a) \( y = 7f(x + 6) - 2 \)
- shift right 6 units, stretch horizontally by a factor of 7, then shift up 2 units
- shift right 6 units, stretch horizontally by a factor of 7, then shift down 2 units
- shift left 6 units, stretch vertically by a factor of 7, then shift up 2 units
- shift left 6 units, stretch horizontally by a factor of 7, then shift down 2 units
- shift left 6 units, stretch vertically by a factor of 7, then shift down 2 units

(b) \( y = 7f(x - 6) + 2 \)
- shift right 6 units, stretch vertically by a factor of 7, then shift up 2 units
- shift left 6 units, stretch horizontally by a factor of 7, then shift up 2 units
- shift right 6 units, stretch horizontally by a factor of 7, then shift up 2 units
- shift right 6 units, stretch vertically by a factor of 7, then shift down 2 units
- shift left 6 units, stretch horizontally by a factor of 7, then shift down 2 units

21. True or false?

(a) If \( f \) has an inverse, then \( f^{-1} \) is the same as \( \frac{1}{f(x)} \).
- true
- false

(b) If \( f \) has an inverse, then \( f^{-1}(f(x)) = x \).
- true
- false

22. A function \( f \) is given, and the indicated transformations are applied to its graph (in the given order). Write the equation for the final transformed graph.

\( f(x) = \sqrt[4]{x} \); reflect in the \( y \)-axis and shift upward 2 units

\( y = \)
23. The graph of a function \( f \) is given. Determine whether \( f \) is one-to-one.

- is one-to-one
- is not one-to-one

24. The graph of a function \( f \) is given. Determine whether \( f \) is one-to-one.

- is one-to-one
- is not one-to-one

25. Determine whether the function is one-to-one.

\[ f(x) = 3x - 7 \]

- is one-to-one
- is not one-to-one
1. Find the missing coordinate of $P$, using the fact that $P$ lies on the unit circle in the given quadrant.

<table>
<thead>
<tr>
<th>Coordinates</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\left( \frac{4}{5}, \right)$</td>
<td>III</td>
</tr>
</tbody>
</table>

2. Find the missing coordinate of $P$, using the fact that $P$ lies on the unit circle in the given quadrant.

<table>
<thead>
<tr>
<th>Coordinates</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\left( \frac{1}{5}, \right)$</td>
<td>II</td>
</tr>
</tbody>
</table>

3. Consider the following.

Find $t$ and the terminal point determined by $t$ for each point in the figure, where $t$ is increasing in increments of $\pi/4$.

<table>
<thead>
<tr>
<th>$t$</th>
<th>Terminal Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(               )</td>
</tr>
<tr>
<td>$\pi/4$</td>
<td>$\left( \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \right)$</td>
</tr>
<tr>
<td></td>
<td>(               )</td>
</tr>
<tr>
<td></td>
<td>(               )</td>
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<td>(               )</td>
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<tr>
<td></td>
<td>(               )</td>
</tr>
<tr>
<td></td>
<td>(               )</td>
</tr>
<tr>
<td>$2\pi$</td>
<td>(               )</td>
</tr>
</tbody>
</table>
Consider the following.

Find \( t \) and the terminal point determined by \( t \) for each point in the figure, where \( t \) is increasing in increments of \( \pi/6 \).

<table>
<thead>
<tr>
<th>( t )</th>
<th>Terminal Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(             )</td>
</tr>
<tr>
<td>( \pi/6 )</td>
<td>(( \sqrt{3} ), ( 1/2 ))</td>
</tr>
<tr>
<td>( \pi/2 )</td>
<td>(             )</td>
</tr>
<tr>
<td>( 2\pi/3 )</td>
<td>(             )</td>
</tr>
<tr>
<td>( \pi )</td>
<td>(             )</td>
</tr>
<tr>
<td>( 5\pi/6 )</td>
<td>(             )</td>
</tr>
<tr>
<td>( \pi )</td>
<td>(             )</td>
</tr>
<tr>
<td>( 7\pi/6 )</td>
<td>(             )</td>
</tr>
<tr>
<td>( \pi )</td>
<td>(             )</td>
</tr>
<tr>
<td>( 2\pi )</td>
<td>(             )</td>
</tr>
</tbody>
</table>
Find sin t and cos t for the values of t whose terminal points are shown on the unit circle in the figure. t increases in increments of π/4.

<table>
<thead>
<tr>
<th>t</th>
<th>sin t</th>
<th>cos t</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>π/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>π/2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3π/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>π</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5π/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3π/2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7π/4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Find the exact value of the trigonometric function at the given real number.

(a) \( \sin \frac{8\pi}{3} \)

(b) \( \csc \frac{8\pi}{3} \)

(c) \( \cot \frac{8\pi}{3} \)

7. Find the exact value of the trigonometric function at the given real number.

(a) \( \sec \frac{10\pi}{3} \)

(b) \( \csc \frac{10\pi}{3} \)

(c) \( \sec \left(-\frac{\pi}{6}\right) \)
Find the amplitude and period of the function.

\[ y = \cos 4x \]

Amplitude: [ ]

Period: [ ]

Sketch the graph of the function.
Find the amplitude and period of the function.

\[ y = 4 \sin \frac{x}{2} \]

amplitude

period

Sketch the graph of the function.
The trigonometric function \( y = \tan x \) has period \( 2\pi \) and the following asymptotes.

- \( x = 2n\pi \) (\( n \) is an integer)
- \( x = \frac{\pi}{2} + 2n\pi \) (\( n \) is an integer)
- \( x = n\pi \) (\( n \) is an integer)
- \( x = \frac{\pi}{2} + n\pi \) (\( n \) is an integer)
- \( x = \frac{3\pi}{2} + 2n\pi \) (\( n \) is an integer)

Sketch a graph of this function on the interval \((-\pi/2, \pi/2)\).

11. Find the degree measure of the angle with the given radian measure.

\[ \frac{\pi}{6} \]

12. The measure of an angle in standard position is given. Find two positive angles and two negative angles that are coterminal with the given angle. (Enter your answers as a comma-separated list.)

\( 135^\circ \)
13. Question Details

The measure of an angle in standard position is given. Find two positive angles and two negative angles that are coterminal with the given angle. (Enter your answers as a comma-separated list.)

\[ \frac{5\pi}{6} \text{ rad} \]

14. Question Details

Solve the right triangle. (Assume \( \theta = 53^\circ \).)

Find the length of the side opposite to the given angle. (Round your answer to two decimal places.)

Find the length of the hypotenuse. (Round your answer to two decimal places.)

Find the other acute angle.

15. Question Details

Find the quadrant in which \( \theta \) lies from the information given.

- \( \tan \theta < 0 \) and \( \sin \theta > 0 \)
- I
- II
- III
- IV

16. Question Details

Find the values of the trigonometric functions of \( \theta \) from the information given.

- \( \cos \theta = -\frac{2}{3} \) \( \theta \) in Quadrant III

- \( \sin \theta = \) 
- \( \tan \theta = \) 
- \( \csc \theta = \) 
- \( \sec \theta = \) 
- \( \cot \theta = \) 

17. Question Details

In triangle ABC with sides \( a, b, \) and \( c \) the Law of Sines states that

\[ \frac{\text{Select} \cdot \text{Select} \cdot \text{Select}}{a} = \frac{\text{Select} \cdot \text{Select} \cdot \text{Select}}{b} = \frac{\text{Select} \cdot \text{Select} \cdot \text{Select}}{c} \]
18. Solve the triangle using the Law of Sines. (Assume $c = 75$, $\angle A = 43^\circ$, and $\angle B = 25^\circ$. Round lengths to two decimal places.)

```
\[ a = \quad b = \quad \angle C = \quad \]
```

19. For triangle $ABC$ with sides $a$, $b$, and $c$ the Law of Cosines states the following.

```
c^2 = 
```

20. Solve triangle $ABC$. (Round the length to three decimal places and the angles to one decimal place.)

```
c = \quad \angle A = \quad \angle B =
```

Assignment Details
This is Exam #3. Please work all the problems, showing ALL necessary work.

1. **Question Details**  
Write the trigonometric expression in terms of sine and cosine, and then simplify.  
\[
\cos t \csc t
\]

2. **Question Details**  
Simplify the trigonometric expression.  
\[
\frac{\csc^2 x - 1}{\csc^2 x}
\]

3. **Question Details**  
Verify the identity.  
\[
\frac{1 + \sec^2 x}{1 + \tan^2 x} = \cos^2 x + 1
\]

4. **Question Details**  
Use an Addition or Subtraction Formula to find the exact value of the expression, as demonstrated in Example 1.  
\[
\cos 165^\circ
\]

5. **Question Details**  
Find \(\sin 2x\), \(\cos 2x\), and \(\tan 2x\) from the given information.  
\[
\csc x = 8, \quad \tan x < 0
\]
\[
\sin 2x =
\]
\[
\cos 2x =
\]
\[
\tan 2x =
\]
Find the rectangular coordinates for the point whose polar coordinates are given.

\((7, 7\pi)\)

\((x, y) = (\ )\)

---

7. Question Details

A point in rectangular coordinates is given. Convert the point to polar coordinates \((r > 0, 0 \leq \theta < 2\pi)\).

\((-7, -7)\)

\((r, \theta) = (\ , \ )\)

---

8. Question Details

Sketch a graph of the polar equation.

\(r = 4\)

Express the equation in rectangular coordinates. (Use variables \(x\) and \(y\).)
9. Write the complex number in polar form with argument $\theta$ between 0 and $2\pi$.

$3 + 3\sqrt{3}i$

10. Find the indicated power using De Moivre's Theorem. (Express your fully simplified answer in the form $a + bi$.)

$(1 + i)^{12}$
Description
This homework assignment covers Chapter 11: 11.1, 11.2, 11.3... Please work as many problems as possible and turn in your work by the due date. Late homework is NOT accepted. As always, if you need anything, please email me Joshua.Patterson@tamuc.edu

1. Question Details
The graph of the equation \( x^2 = 4py \) is a parabola with focus \( F(x, y) = (0, y) \) and directrix \( y = \ldots \). So the graph of \( x^2 = 8y \) is a parabola with focus \( F(x, y) = (0, y) \) and directrix \( y = \ldots \).

2. Question Details
Find an equation for the parabola that has its vertex at the origin and satisfies the given condition.
Focus \( F(0, 2) \)

3. Question Details
Find an equation for the parabola that has its vertex at the origin and satisfies the given condition.
Focus \( F(-5, 0) \)

4. Question Details
Find an equation for the parabola that has its vertex at the origin and satisfies the given condition.
Directrix \( y = 7 \)

5. Question Details
Find an equation for the parabola that has its vertex at the origin and satisfies the given condition.
Directrix has \( y \)-intercept \( 4 \)

6. Question Details
The graph of the equation \( \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \) with \( a > b > 0 \) is an ellipse with vertices \( (x, y) = (\ldots) \) and \( (x, y) = (-a, 0) \) and foci \( (\pm c, 0) \), where \( c = \ldots \). So the graph of \( \frac{x^2}{10^4} + \frac{y^2}{8^4} = 1 \) is an ellipse with vertices \( (x, y) = (\ldots) \) (larger \( x \)-value) and \( (x, y) = (\ldots) \) (smaller \( x \)-value) and foci \( (x, y) = (\ldots) \) (larger \( x \)-value) and \( (x, y) = (\ldots) \) (smaller \( x \)-value).
7. Find an equation for the ellipse that satisfies the given conditions.
   Length of major axis: 8, length of minor axis: 6, foci on x-axis

8. Find an equation for the ellipse that satisfies the given conditions.
   Foci: (±7, 0), length of major axis: 16

9. Find an equation for the ellipse that satisfies the given conditions.
   Endpoints of major axis: (±10, 0), distance between foci: 4

10. The graph of the equation \( \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \) with \( a > 0, b > 0 \) is a hyperbola with vertices \((x, y) = (\), \) and \((x, y) = (-a, 0)\) and foci \((x, y) = (\pm c, 0)\), where \(c = \). So the graph of \( \frac{x^2}{4^2} - \frac{y^2}{3^2} = 1 \) is a hyperbola with vertices \((x, y) = (\) (larger x-value) and \((x, y) = (\) (smaller x-value) and foci \((x, y) = (\) (larger x-value) and \((x, y) = (\) (smaller x-value).

11. Find an equation for the hyperbola that satisfies the given conditions.
   Foci: (±10, 0), vertices: (±6, 0)

12. Find an equation for the hyperbola that satisfies the given conditions.
   Foci: (±11, 0), vertices: (±8, 0)

13. Find an equation for the hyperbola that satisfies the given conditions.
   Foci: (9, 0), hyperbola passes through (12, 3)