MATH 95
EXAM 4

Show all necessary work. Each problem is worth 4 points. Good luck!

1. Is the following a function?

\[
\begin{align*}
3 & \rightarrow 2 \\
7 & \rightarrow 4 \\
11 & \rightarrow 6 \\
13 & \rightarrow 8 \\
10 & \\
\end{align*}
\]

1. \( \text{NO} \)

2. For the following graph of \( f \), determine the domain and range of \( f \).

\[
\begin{align*}
\text{domain} & \quad 0 \leq x \leq 5 \\
\text{range} & \quad 0 \leq y \leq 6 \\
\end{align*}
\]

2. \( \text{domain} \quad 0 \leq x \leq 5 \)

3. For the graph of \( f \) above, find \( f(3) \) and a value of \( x \) for which \( f(x) = 2 \).

3. \( f(3) = 4 \)

4. Find the domain of the function: \( g(x) = \frac{x+3}{x^2 + 3x - 10} \)

a. \( \{x \mid x \in \mathbb{R} \text{ and } x \neq -3\} \)

b. \( \{x \mid x \in \mathbb{R} \text{ and } x \neq -2, 5\} \)

c. \( \{x \mid x \in \mathbb{R} \text{ and } x \neq 2, -5\} \)

d. \( \{x \mid x \in \mathbb{R} \text{ and } x \neq -3, 2, -5\} \)

4. \( C \)

5. Determine if the following graph is a function.

5. \( \text{NO} \)
6. Which equation is NOT linear?
   a. $3y + x - 4 = 3x - 9$
   b. $x = 4y - 3$
   c. $x = 2y^2 - 5$
   d. $x = -8$

7. For $f(x) = -2x^2 - x + 4$, find $f(-2)$
   a. $-2$
   b. $-6$
   c. 10
   d. 14

8. Given $g(x) = -3x - 4$ and $h(x) = x^2 + 2$, find $(g \cdot h)(2)$.
   a. $-60$
   b. $-4$
   c. 8
   d. 16

9. Given $f(x) = 3x + 2$ and $g(x) = -x + x^2$, find $(g - f)(x)$.
   a. $x^2 - 4x - 2$
   b. $x^2 - 2x + 2$
   c. $x^2 - 4x + 2$
   d. $3x^3 - 5x^2 + 2x$

10. If $y$ varies directly as $x$ and $y = 0.9$ when $x = 0.5$, find the equation of variation.
    
    $y = kx$
    $0.9 = k \cdot 0.5$
    $k = 1.8$

11. Solve $\frac{E}{e} = \frac{R + r}{R}$ for $R$.

    $ER = eR + er$
    $ER - eR = er$
    $R(e - e) = er$
    $R = \frac{er}{e - e}$
12. The time $T$ required to do a job varies inversely as the number of people $P$ working. It takes 4 hr. for 5 volunteers to pick up rubbish from 1 mile of roadway. How long would it take 8 volunteers to complete the job?

$$T = \frac{k}{P}$$

$$T = \frac{20}{5}$$

$k = 20$

$$T = \frac{20}{8}$$

13. Solve the system of equations graphically:

$$y = x + 3$$

$$y = -\frac{1}{2}x$$

14. Solve the system of equations using substitution:

$$y = x + 4$$

$$6x - 3y = -15$$

$$6x - 3(x + 4) = -15$$

$$6x - 3x - 12 = -15$$

$$3x - 12 = -15$$

$$3x = -3$$

$$x = -1$$

$$y = -1 + 4$$

$$y = 3$$

15. Solve the system of equations using elimination:

$$2x + 4y = 8$$

$$3x - 4y = -21$$

$$5x = -13$$

$$x = -\frac{13}{5}$$
16. What is the measure of one interior angle of a regular 15-gon?
   a. 2340°
   b. 156°
   c. 180°
   d. 24°
   \[ \frac{(n-2) \times 180}{n} = \frac{(15-2) \times 180}{15} = \frac{2340}{15} = 156° \]

17. Find the measure of each angle of the triangle.
   \[ 3x + x + 88 = 180 \]
   \[ 4x + 88 = 180 \]
   \[ 4x = 92 \]
   \[ x = 23 \]
   A = 88°
   B = 69°
   C = 23°

18. Classify the triangle shown as equilateral, isosceles, or scalene. Then classify as right, obtuse or acute.
   Equalateral
   Acute

19. Choose the true statement:
   a. \( m \angle PLM + m \angle LGH = 180° \)
   b. \( \angle FGL \) and \( \angle AEF \) are complementary
   c. \( \angle FGL \) and \( \angle GLK \) are supplementary
   d. \( m \angle JEF = m \angle LGH \)
21. Determine if the following are always true:

- T F  Every square is a rectangle.
- T F  Every rhombus is a parallelogram.
- T F  Any fact that is true for every parallelogram is also true for every square.
- T F  Any fact that is true for every rectangle is also true for every quadrilateral.

22. The area of the polygon is 58 m². Find the missing lengths and the perimeter. (Assume all angles are right angles)

\[ P = 7 + 10 + 4 + 4 + 3 + 10 = 34 \text{ m} \]

23. A parallelogram has sides of 6 cm and 10 cm. Which of the following statements is true?

- a. The area is 60 cm²
- b. The area is greater than 60 cm²
- c. The area is less than 60 cm²
- d. There is not enough information

24. Find the area of the triangle measured as shown.

\[ \frac{1}{2} (6)(5) = 15 \]

25. What is the area of the trapezoid shown below?

\[ \frac{1}{2} (5.5 + 8.5)(2) = 14 \]
26. The quarter circle has an area of $25\pi$ m². What is the perimeter?

\[
x = \frac{\pi}{100} \text{ m}^2 \text{ for whole circle}
\]
\[100\pi 	ext{ m}^2 \text{ so } r = 10\]
\[\frac{1}{4} \text{(circumference)} = \frac{1}{4} (2\pi \cdot 10) = 5\pi\]

27. Find the area of the shaded region (The rectangle has a circle and square corner removed)

\[A \text{ rect} = 22.3 \times 14 = 312.2\]
\[A \text{ region} = 312.2 - 36 = 276.2\]
\[A \text{ circle} = 25\pi \approx 78.5\]
\[276.2 - 78.5 = 197.7\]

28. Determine if each pair of triangles is congruent. State the theorem used to check.

a. YES  NO

Theorem: \(\text{ASA or SSS}\)

\[\angle 1 = \angle 1\]
\[\angle 2 = \angle 2\]
\[\angle 3 = \angle 3\]
\[\text{SSS}\]

b. YES  NO

Theorem: \(\text{SSS}\)

\[\text{SSS}\]

29. Tell why the following two triangles are similar or not similar:

\[\overset{\text{NO}}{\overbrace{\text{Sides are not in ratio}}}\]
\[
\frac{6}{3} \neq \frac{7}{4} \neq \frac{8}{5}
\]
30. Assume the triangles are similar. Find x and y.

\[
\frac{6}{x} = \frac{3}{y} = \frac{7}{20}
\]

120 = 7x  
\[x = 17.14\]

110 = 7y  
\[y = 22.86\]

31. Kelly is 63 inches tall. At 11 am her show is 44 inches long. The shadow of a nearby flagpole is 216 inches long. How high is the flagpole?

\[
\frac{63}{44} = \frac{x}{216}
\]

\[x = 309.3 \text{ in.}\]

32. Use the Pythagorean theorem to find x in the triangle. (Hint: you may need to use it more than once)

\[
8^2 + y^2 = 10^2
\]

\[64 + y^2 = 100\]

\[y^2 = 36\]

\[y = 6\]

33. EXTRA CREDIT: A plan calls for running a telephone line from P to Q to R. The line costs $7/meter. If it is feasible to run the line directly from P to R, how much money would one save?

\[
9^2 + 12^2 = x^2
\]

\[81 + 144 = x^2\]

\[225 = x^2\]

\[x = 15\]

\[4 \times 7 = 42\]

\[12 + 9 = 21\]

\[-15\]

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