Assignment 12

Due on 20th of July, 2021

Section A

1. Calculate the length of the side of a square with an area of 16 square units.  
   Answer: 4 units

2. Find the circumference of a circle with a radius of 3 meters.  
   Answer: 6π meters

3. Determine if the triangle with sides of lengths 5, 12, and 13 units is a right triangle.  
   Answer: Yes, it is a right triangle

4. Solve the equation 2x + 3 = 7 for x.  
   Answer: x = 2

Section B

1. Convert 120 degrees to radians.  
   Answer: 2π/3 radians

2. Calculate the area of a circle with a diameter of 8 units.  
   Answer: 16π square units

3. Simplify the expression (x^2 - 4) / (x - 2).  
   Answer: x + 2 (for x ≠ 2)

Section C

1. Find the derivative of the function f(x) = 3x^2 - 2x + 1.  
   Answer: f'(x) = 6x - 2

2. Evaluate the definite integral ∫ from 1 to 3 of (2x + 1) dx.  
   Answer: 10

Section D

1. Solve the system of equations:
   
   \[ \begin{align*}
   2x + 3y &= 7 \\
   x - y &= 1 
   \end{align*} \]
   
   Answer: x = 2, y = 1

2. Graph the function f(x) = x^2 - 4x + 4.  
   [Graph of the parabola]

Section E

1. Write a short essay on the importance of mathematics in everyday life.  
   [Essay: Mathematics is fundamental in various aspects of daily life, from budgeting and shopping to understanding statistical data and making informed decisions.]

2. Solve the following problem:
   
   A carpenter is building a rectangular fence with a perimeter of 60 feet. The length of the fence is twice the width. Find the dimensions of the fence.  
   Answer: Length = 20 feet, Width = 10 feet

Section F

1. Prepare a presentation on the Pythagorean theorem.  
   [Presentation slides on the Pythagorean theorem]

2. Write a program to calculate the area of a triangle given its base and height.  
   [Python code:]

   ```python
   def triangle_area(base, height):
       return 0.5 * base * height
   ```

Section G

1. Study the properties of trigonometric functions and their graphs.  
   [Graphs of sine, cosine, and tangent functions]

2. Investigate the concept of limits and how they are used in calculus.  
   [Article: Limits are crucial in calculus, providing the foundation for derivatives and integrals, and enabling the analysis of functions at infinity or near specific points.

Section H

1. Discuss the role of mathematics in scientific research and technology.  
   [Discussion points: Mathematics is indispensable in fields such as physics, engineering, and computer science, enabling the formulation of theories and the design of innovative technologies.

2. Research and report on the history of mathematics.  
   [Report: A brief history of mathematics, highlighting key developments and influential mathematicians.