Mid-Term Assessment (Spring 2021)
Department of Mathematics & Physics
School of Engineering & Physical Sciences
North South University

Course Instructor:
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COURSE CODE: MAT 116 **TITLE: PRE-CALCULUS** **SEC - 10**

Instructions:

- *You must answer all the questions.*
- *You may prepare the assignment by typing or by handwriting. For handwritten, please write your answers neatly in a clear white paper and compile your work into a single PDF.*
- *Write your ID at the top of each page of your assignment.*

Important Notes:

- ***You have to solve the assignment with honesty and integrity.***
- ***Submit the assignment as soon as you complete it.***
- ***You should not share your solutions with others. Each submission will be carefully examined. and it may go through 'plagiarism test' on your assignment.***
- ***Significant similarity (copying from others) would severely reduce marks from both.***
- ***This submission will carry 20% marks for grading.***
- ***Please note that a viva for 5 marks will be taken later on the topics/problems of assignment.***

Problem 01:

(a) Define midpoint formula. Plot $P(4,6)$, $Q(-4,5)$ and $R(4,-4)$ in a coordinate plane and find, between P and Q, which one is closer to R.

(b) Find an equation of the line AB by joining the points $A(0,2)$ and $B(6,5)$. Also find the equation of the line which is parallel to the line segment AB and pass through the point $(-5,10)$. Draw both lines in the same graph.

(c) Find an equation of the circle that lies in the third quadrant, tangent to both $x-axis$ and $y-axis$ with radius 5. Draw the graph of the circle.

Problem 02:

(a) Sketch the graph of $f(x)=\frac{1}{2}x+1$ and $y=|x-4|$ in the same coordinate system. Find where the graph intersects, label the coordinate of those point(s) and then find the area of the region bounded by the two graphs.

(b) If $f(x)=4x^3+Qx^2-4x+16$ and $f(3)=50$, what is the value of Q?

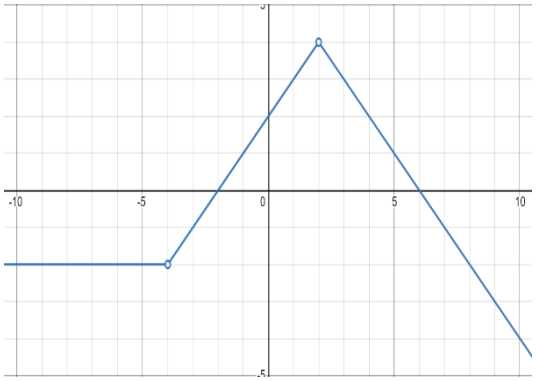
(c) Determine algebraically whether the function $y=-5x^9+8x^5-3x^3+9x$ is even, odd or neither. Also check their symmetry.

Problem 03:

(a) How do you determine whether the graph of an equation represents a function or not? Explain your answer by giving an example of your favorite function.

(b) Write the domain of the function $f(x) = \frac{\sqrt[3]{4+5x}}{3x+1}$ in interval notation. Draw the graph of the solution set on real number line.

(c) Write the piecewise function from the following graph:

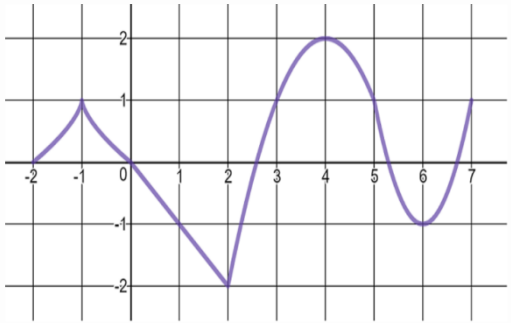


Problem 04:

(a) Create a function in which the domain is $x > \frac{1}{4}$.

(b) From the graph, find the interval(s) where the function is increasing, decreasing or constant.

(c) Find the local maxima, local minima, absolute maxima and absolute minima. Write down their values.



Problem 05:

(a) What is the vertex of a quadratic function?

(b) The following table represents the body temperature of a person for last 5 days. Plot the ordered pairs in a cartesian plane and mathematically determine whether the function is linear or not?

Day	Body Temperature (in Fahrenheit)
1	97.5
2	99
3	99.3
4	100
5	101

(c) A ball was thrown from the top of a hill which is 200 feet above the ground at an inclination angle 45^0 to the horizontal. The height of the ball h above the ground can be modeled by $h(x) = \frac{-x^2}{2000} + x + 200$, where x is the horizontal distance. How far from the base of the hill will the ball hit the ground? What will be the domain of the function in that situation?