

Math 13200 – Section 58 – Midterm 1

April 13, 2016

Information and Directions

- This exam will last 50 minutes.
- This is a closed-book exam.
- No electronic devices are allowed to be used during this exam.
- **Partial credit is given for showing your calculations and explaining your thoughts.**

Name: _____

Problem	Points	Score
1	8	
2	4	
3	16	
4	16	
5	16	
6	20	
7	20	

Problem 1 (8 points)

Define $\cos(t)$ and $\sin(t)$ based on moving around the unit circle.

Be detailed.

Problem 2 (4 points)

What is $\csc(\pi/4)$?

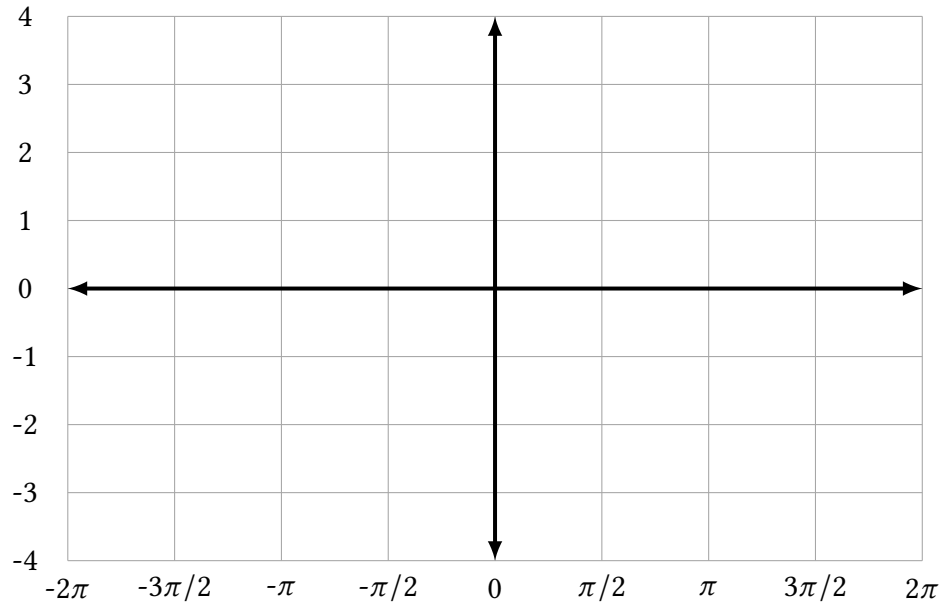
Problem 3 (16 points)

Part 1 (8 points)

Draw the graph of the equation

$$y = \sin(x)$$

For at least three different points on your graph, label the point with its x - and y -coordinates.

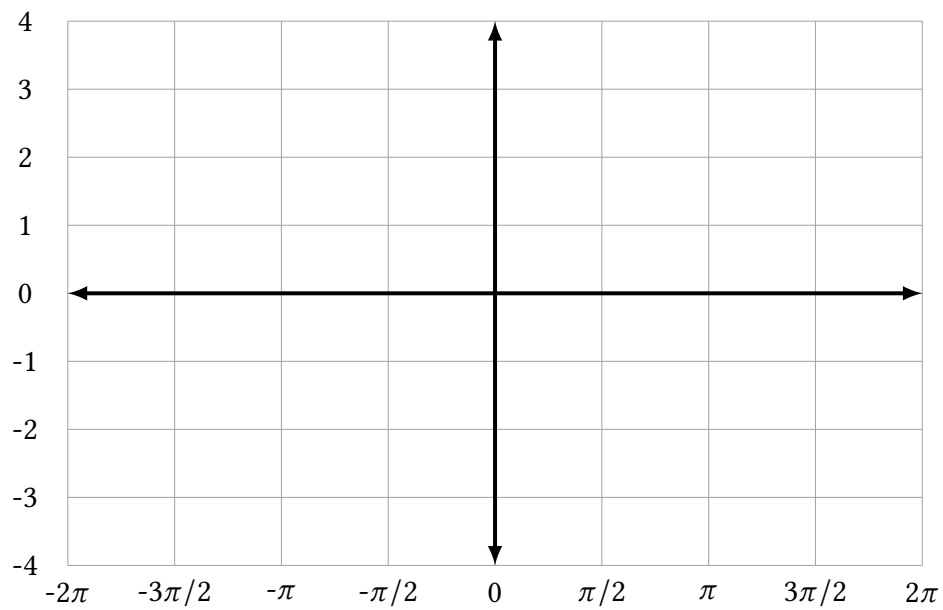


Part 2 (8 points)

Draw the graph of the equation

$$y = \sin(2x) + 1$$

For at least three different points on your graph, label the point with its x - and y -coordinates.



Problem 4 (16 points)

What is the equation of the tangent line to $y = \cos(x)$ at $x = \pi/3$?

Problem 5 (16 points)

What is the derivative of $\sin(x^3)$?

Problem 6 (20 points)

For this problem, define the function

$$f(x) = x^3 - 12x$$

Part 1 (10 points)

Find the critical points of f on the interval $[-3, 5]$.

For each of them, specify which kind of critical point it is (remember, there are three kinds).

Part 2 (10 points)

(Remember, the function f was defined at the beginning of this problem.)

Find the maximum and minimum value that f reaches on the interval $[-3, 5]$.

Problem 7 (20 points)

For this problem, define the function

$$g(x) = -2x^3 + 6x^2 + 18x$$

Part 1 (10 points)

Where is g decreasing?

(Hint: Find g' and use the “Monotonicity Theorem”. Your answer should be an interval or intervals.)

Part 2 (10 points)

(Remember, the function g was defined at the beginning of this problem.)

Where is g concave up?

(Hint: Find g'' and use the “Concavity Theorem”. Your answer should be an interval or intervals.)