MATH 142

Midterm 1

Feb 25, 2014

NAME (please print legibly): ______________________________

Your University ID Number: ______________________________

Circle your Instructor's Name along with the Lecture Time:

Yoonbok Lee (MWF 9:00)   Dillon Ethier (MWF 12:00)
Carl Mueller (MWF 1:00)   Eyvindur Palsson (TR 2:00)

- **No calculators are allowed on this exam.**
- **Please show all your work. You may use back pages if necessary. You may not receive full credit for a correct answer if there is no work shown.**
- **Please put your simplified final answers in the spaces provided.**

QUESTION	VALUE	SCORE
1	24	
2	21	
3	15	
4	20	
5	20	
TOTAL	100	

1. (24 points)

(a), (6 points) Find the vertical and horizontal asymptotes of

$$f(x) = \frac{2x^2 + x + 1}{x^2 - 2}.$$

ANSWER: ____________________

(b), (6 points) Does the following function have any symmetry? If so, what kind of symmetry does it have?

$$f(x) = \frac{\sin(x)}{2 + \cos(x)} - x^3$$

ANSWER: ____________________

(c), (6 points) Find the intervals of increase and decrease for the following function. Then find the points x where the function has a local maximum or local minimum.

$$f(x) = \frac{x^5}{5} - \frac{4x^3}{3} + \frac{7}{2}$$

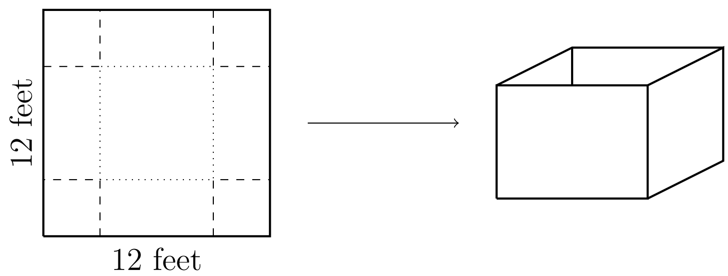
ANSWER: ______________________

(d), (6 points) Using the same function $f(x)$ as in part (c), find the intervals on which the function is concave up and concave down, and find the points of inflection.

ANSWER: ______________________

2. (21 points)

Suppose a box with an open top is to be made by cutting squares out of the corners of a 12 foot by 12 foot square piece of cardboard, then folding up the flaps to make sides. What is the maximum volume of such a box?



ANSWER: ____________________

3. (15 points) Find the antiderivatives of the following functions.

(a), (5 points)

$$\frac{x^3 - 4x}{x^{3/2}}, \qquad \text{for } x > 0.$$

ANSWER: ____________________

(b), (5 points)

$$2\sin(x) - x^2$$

ANSWER: ______________________

(c), (5 points)

$$2e^{x/2}$$

ANSWER: ______________________

4. (20 points)

Evaluate the following definite integrals:

(a), (10 points)

$$\int_0^3 \sqrt{9 - x^2}\,dx$$

ANSWER: ________________________

(b), (10 points)

$$\int_{-2}^{1} \Big(|x| - 1\Big)\,dx$$

ANSWER: ________________________

5. (20 points) Consider the integral

$$\int_1^3 e^{\sqrt{x}} dx$$

Write a Riemann sum for this integral. Assume that the partition has $n = 4$ subintervals of equal length, and the points x_i^* are at the midpoint of each interval. Just write down the Riemann sum, and do not try to evaluate the integral.

ANSWER: ______________________