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PII X
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MATH 171
Second Midterm Exam
Prof. Jesenko Vukadinovic

Name: _____

Section: _____

TA: _____

P1	
P2a	
P2b	
P3	
P4a	
P4b	
P5	
TOTAL	

Read each question carefully and try to understand it before answering the questions. You may use the back of the pages if you need extra space. **Show all the computations to get full credit. Write clearly.** Good luck!!

1. For the function

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

determine the domain, find the vertical and horizontal asymptotes, and then sketch the graph.

2. (a) Using the rules for differentiation, find the derivative

$$\frac{d}{dx} \left(\frac{2}{\sqrt{x^2 + 4}} \right)$$

(b) Find dy/dx if

$$x^2 + 2xy + 4y^2 = r^2.$$

3. A student is using a straw to drink from a conical paper cup, whose axis is vertical, at a rate of 10 cubic centimeters a second. If the height of the cup is 4 centimeters, and the diameter of the opening 8 centimeters, how fast is the level of the liquid falling when the depth of the liquid is 2 centimeters?

4. (a) Verify the trigonometric identity

$$\frac{\cos \theta}{1 - \sin \theta} = \sec \theta + \tan \theta.$$

(Hint: What happens when you multiply the denominator by its conjugate? Think rationalizing the denominator...)

(b) If $\tan \theta = -\frac{3}{4}$, and $\sin \theta > 0$, find $\cos \theta$.

5. Find the period, the amplitude, and the phase shift, and sketch the graph of the equation:

$$y = 3 \cos(3x - \pi) - 2.$$