

MATH 171
Final Exam
Prof. Jesenko Vukadinović

Name: _____

Section: _____

TA: _____

P1a	
P1b	
P1c	
P2a	
P2b	
P3a	
P3b	
P4a	
P4b	
P5a	
P5b	
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

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

(a) determine the domain, find the vertical and horizontal asymptotes

(b) using the first and second derivative, determine where the graph is increasing, decreasing, concave up, and concave down

(c) sketch the graph

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

$$\frac{d}{dx} \left(\frac{1}{\sqrt{\cos^2 2x + 1}} \right)$$

(b) Find dy/dx if

$$x \cos y = x^2 + \sin y.$$

3. Solve (and check!!! your answer)

(a)

$$\sqrt{5+x} - x = 5.$$

(b)

$$\frac{1}{x-2} \geq \frac{3}{x+1}.$$

4. (a) Verify the trigonometric identity

$$(\csc \theta + \cot \theta)^2 = \frac{1 + \cos \theta}{1 - \cos \theta}.$$

(b) Find the exact value of the expression

$$\cos \left[\arcsin \left(-\frac{3}{5} \right) - \arccos \frac{5}{13} \right].$$

DO NOT use the calculator to evaluate the arcsin and arccos! You will lose points if you do that.

5. Find the following limits if they exist:

(a)

$$\lim_{t \rightarrow \infty} \cos \left(\frac{\pi}{6} - \frac{5}{t^3} \right).$$

(b)

$$\lim_{h \rightarrow 0} \frac{\cos(\frac{\pi}{3} + h) - \frac{1}{2}}{h}$$

[Hint: What is this by definition?]