

EXAM 1
MAT 221

Name _____

September 23, 2011

- ❖ You have 50 minutes to complete the exam.
- ❖ Partial credit will be given so you must **SHOW ALL OF YOUR WORK**. Put all of your work and answers in the space provided. Scratch paper is not allowed.
- ❖ Place your books, notebooks, etc. on the floor. The only items on your desk should be this exam and pencil/eraser/pen. Calculators are not allowed.

Problem	Points	Points per part	Points Earned
True-False	10	2	
1	4	2	
2	4	2	
3	5		
4	5		
5	5		
6	8	4	
7	15	3	
8	8	2,3,3	
9	30	6	
10	6		
TOTAL	100		

Please circle your section:

8:00
Friske

1:30
Friske

I. True – False

- T F a. The domain of the function $f(x) = \ln x$ is $0 \leq x < \infty$.
T F b. A vertical line has no slope.
T F c. $f(x) = x^3$ is an odd function.
T F d. The greatest integer function $y = [x]$ is right continuous at every real number x .
T F e. $y = \sqrt{\frac{x^2-1}{x+2}}$ is an algebraic function.

II. Basics

1. Evaluate.

a. $\sin\left(\frac{-\pi}{6}\right) =$ _____ b. $\sec \pi =$ _____

2. Evaluate.

a. $\arccos \frac{1}{2} =$ _____ b. $\tan(\arccos x) =$ _____

3. Solve for x : $e^{2x-1} = 5$.

4. Expand using properties of the logarithm: $\ln \frac{\sqrt{x+1}}{x-2} =$ _____

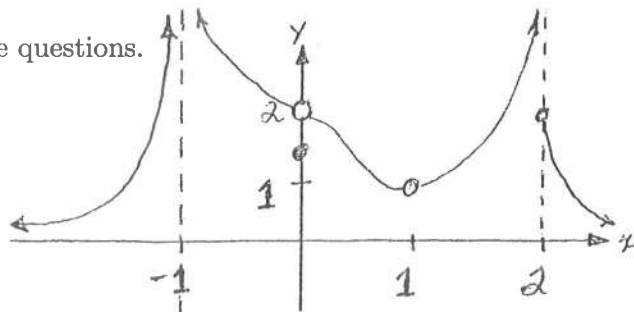
III. Applications.

5. At which values of x does $f(x) = \frac{x^2 - 3x + 2}{x^2 + x - 2}$ have a vertical asymptote?

6. Evaluate the following limits where $f(x) = \frac{x^2 + 2}{x - 1}$.

a. $\lim_{x \rightarrow 1^-} f(x) =$ _____ b. $\lim_{x \rightarrow 1^+} f(x) =$ _____

7. Use the graph of $y = g(x)$ on the right to answer the questions.



(a) $\lim_{x \rightarrow 2^+} g(x) =$ _____

(b) $\lim_{x \rightarrow 1^-} g(x) =$ _____

(c) $\lim_{x \rightarrow -1^-} g(x) =$ _____

(d) On which open intervals is $g(x)$ continuous? _____

(e) At which values of x does $g(x)$ have removable discontinuities? _____

8. For the function $f(x) = \frac{x^2 + 2x}{x^2 + x - 2}$

(a) Find an equation for each vertical asymptote.

(b) Find all values of x at which $f(x)$ is discontinuous. _____

(c) Which of the discontinuities in part b are removable? Why? _____

9. Find each of the following limits or explain why the limit does not exist. For infinite limits write ∞ or $-\infty$ in the blank.

(a) $\lim_{x \rightarrow 1^+} \frac{x^2 - 2x}{\ln(x + 1)} =$ _____

(b) $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x^2 - x - 6} =$ _____

(c) $\lim_{x \rightarrow 3} \frac{\sqrt{x + 1} - 2}{x - 3} =$ _____

$$(d) \lim_{x \rightarrow 0} \frac{2 \sin 3x}{x} = \underline{\hspace{2cm}}$$

$$(e) \lim_{x \rightarrow 1^+} \frac{x^2 + 1}{x - 1} = \underline{\hspace{2cm}}$$

10. State precisely what it means for $f(x)$ to be continuous at $x = c$. There are three conditions.