Math 1351-011 Exam I-D September 22, 2006

Answer the problems on **separate** paper. You do not need to rewrite the problem statements on your answer sheets. Do your own work. Show **all relevant steps** which lead to your solutions. Attach this question sheet to the front of your answer sheets.

1. (12 pts) Let $P(-3,2)$ and $Q(2,-4)$ be points in the plane.

   A. Plot P and Q on a Cartesian coordinate system
   B. Find the distance between P and Q
   C. Find the coordinates of the midpoint M of the line segment $\overline{PQ}$

2. (10 pts) Solve

   A. the equation $|4-3y|=8$
   B. the inequality $x^2-4x>0$

3. (4 pts) Find the center and radius of the circle given by

   $$x^2+y^2-2x+10y-2=0$$

4. (4 pts) Find the equation of the line which passes through (-2,3) and is parallel to the line given by $3x-4y=4$.

5. (12 pts) Let $f(x)=\dfrac{\sqrt{x}}{x-1}$.

   A. Find the domain of f
   B. Compute the following functional values or state that the corresponding x-value is not in the domain of f

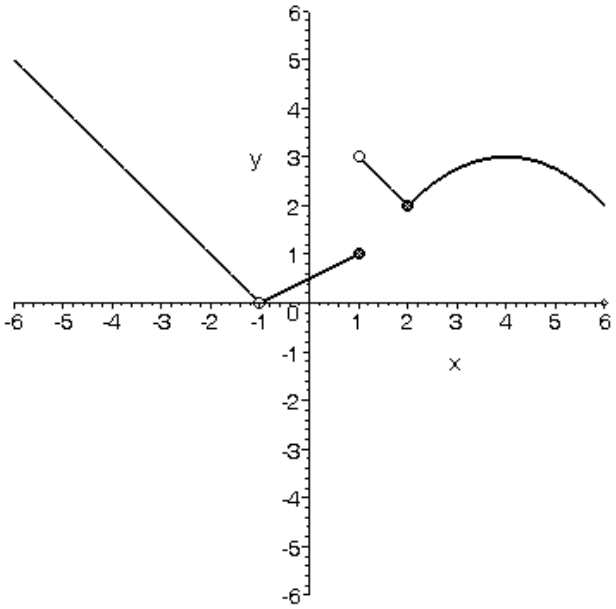
   B1. $f(-1)$ B2. $f(0)$ B3. $f(2)$

6. (6 pts) Simplify $\tan(\cos^{-1}2x)$

7. (6 pts) Solve the equation

   $$\log_4 x+\log_4(x-15)=2$$

8. (15 pts) Consider the function f defined by the graph to the right. Find each of the following (if they exist). If they do not exist, state so. Also determine if the function is continuous at the given point. If it is not continuous at the given point, state so.



A1. $f(-1)$ A2. $f(1)$ A3. $f(2)$

B1. $\lim_{x\to -1^-} f(x)$ B2. $\lim_{x\to 1^-} f(x)$ B3. $\lim_{x\to 2^-} f(x)$

C1. $\lim_{x\to -1^+} f(x)$ C2. $\lim_{x\to 1^+} f(x)$ C3. $\lim_{x\to 2^+} f(x)$

D1. $\lim_{x\to -1} f(x)$ D2. $\lim_{x\to 1} f(x)$ D3. $\lim_{x\to 2} f(x)$

E1. Is f continuous at -1? E2. Is f continuous at 1? E3. Is f continuous at 2?

9. (24 pts) Algebraically evaluate each of the following limits.

A. $\lim_{x\to -1} \dfrac{x^2+3x-2}{x^2-2x-2}$

B. $\lim_{x\to -3} \dfrac{x^2+x-6}{x^2+3x}$

C. $\lim_{x\to 0} \dfrac{4x^2}{\sin^2 2x \cos x}$

10. (8 pts) Find the constant a so that $f(x)=\begin{cases} 2x+a & x<1 \\ 2ax^2-1 & x\geq 1 \end{cases}$ will be continuous at $x = 1$.