**Department of Mathematics**
**Howard University**
**Math-006 College Algebra 1 Final Examination**
**December 7, 2010**

The examination consists of 2 pages with a total of 200 points.
Please do all problems.

1.[14 points] Factor completely.
(a) $2x^3+3x^2-2x-3$ (b) $2x^3+18x^2+28x$

2.[14 points] Perform the indicated operations and simplify. Leave your answer in factored form.

$$(a)\quad \frac{x}{x^2-7x+6}-\frac{x}{x^2-2x-24} \qquad (b)\quad \frac{\frac{x+4}{x-2}-\frac{x-3}{x+1}}{x+1}$$

3.[7 points] Given that $x$ and $y$ are positive, simplify

$$\frac{(243x^5y)^{1/4}}{(3xy)^{1/4}}.$$

Write your answer so that each variable appears only once.

4.[10 points] A total of $10,000 is to be shared between Ben and Jerry. Jerry is to receive 3 times as much as Ben. How much will each receive?

5.[42 points] Find all real solutions , if any, of each equation.

(a) $4x^2-6x-9=0$
(b) $x=2\sqrt{x-1}$
(c) $2x^3+5x^2-8x-20=0$
(d) $5^{x+3}=\frac{1}{5}$
(e) $4^{x^2}=2^x$
(f) $e^{5x}=e^{3-x}$

6.[32 points] Solve each inequality, and give the solution in interval notation. Also, graph the solution set.

(a) $x(9x-5) \leq (3x-1)^2$

(b) $|2-3x| > 1$

(c) $|4x-3| \leq 1$

(d) $4x^2 < 13x - 3$

7.[5 points] Find the distance between the points $(3,-4)$ and $(5,4)$.

8.[10 points] Verify that the triangle with vertices $A = (-5,3)$, $B = (6,0)$, and $C = (5,5)$ is a right triangle.

9.[7 points] Find an equation for the line with slope $-\frac{2}{3}$ and containing the point $(1,-1)$.

10.[7 points] A line has equation $7x + 2y = 21$.

(a) Find the slope and $y-$intercept of the line.

(b) Graph the line.

11.[10 points] A circle has equation $x^2 + y^2 - 2x - 4y - 4 = 0$.

(a) Find the center and radius of the circle.

(b) Graph the circle.

12.[10 points] Consider the function $f(x) = \begin{cases} x+3 & \text{if } x<-2 \\ -2x-3 & \text{if } x \geq -2 \end{cases}$

(a) Graph the function.

(b) Find the range of the function.

13.[10 points] Sketch the graph of the function $f(x) = x^2 - 2x$ and find its range.

14.[8 points] Let $f(x) = \sqrt{x+1}$ and $g(x) = 3x$.

(a) Find $(f \circ g)(1)$.

(b) Find $(g \circ f)(1)$.

15.[14 points] Find the amount that results from each investment.

(a) **$500 invested at 8%** compounded monthly after a period of 4 years.

(b) **$500 invested at 8%** compounded continuously after a period of 4 years.