HOWARD UNIVERSITY
Department of Mathematics
College Algebra 1 - Math 006
Final Examination
Tuesday April 30, 2013

Instructions: This examination consists of 16 exercises worth a total of 200pts. Answer all questions. Show your work neatly. **Calculators are not allowed.**

1. [10 points] Find all real solutions. If there are none, say so.
(a) $2x + 1 = x - 3$
(b) $\frac{x}{x-1} = \frac{x+2}{x-3}$

2. [15 points] How much pure alcohol should be added to 1 liter of a 30% alcohol solution to get a 50% solution?

3. [15 points] Solve the following equations.
(a) $x^2 - 2x - 24 = 0$
(b) $\sqrt{x-2} = x - 4$

4. [15 points] Solve the following inequalities, writing your answer in interval notation.
(a) $2x + 3 < 4x - 1$
(b) $|3x - 1| < 5$
(c) $|4 - x| > 2$

5. [10 points] Let A = (2, 1) and B = (−6, 5).
(a) Find the distance between A and B.
(b) Find the midpoint of the line segment between A and B.

6. [15 points]
(a) Write an equation for the circle with center (3, -1) and radius $\sqrt{5}$
(b) Find the center and radius of the circle with equation
$x^2 + y^2 - 6x + 4y - 3 = 0$.

7. [10 points] Find an equation for the line through (6, 2) and perpendicular to the line passing through (1, 1) and (7,4).

8. [15 points] Write the equation expressing the facts that t is jointly proportional to r *and* s and inversely proportional to u, and that if $r = 3,\ s = 2, and\ u = 12$, then $t = 15$.

9. [10 points] Find the domain of the function $f(x) = \frac{\sqrt{4-x^2}}{x}$.

10.[10 points] Oliver has to borrow \$15,000 for a year in order to pay his school debts. His bank offers to lend him the money at a simple interest rate of 8% per year.
(a) How much money will Oliver owe in interest?
(b) How much does Oliver have to pay the bank at the end of the one year?

11. [10 points] Jasmine deposits \$2,000 in a savings account at the bank. The bank offers 5% interest compounded quarterly. How much will Jasmine have in the savings account after 1 year? Leave your answer as a fraction raised to a power. Do not calculate.

12. [10 points] Find the average rate of change of the function $f(x) = x^4 - 4x$ between $x = -1$ and $x = 3$.

13. [10 points] How many complete revolutions a circular disk with radius 3 feet would have made when it has rolled 94.2 feet? (Take $\pi = 3.14$)

14.[15 points] Let $f(x) = 3^x$.
a) What is $f(4)$?
b) If $f(x) = \frac{1}{9}$, What is x?
c) Sketch the graph of the function f.

15.[15 points] Sketch the graph of the quadratic function $f(x) = x^2 - 2x - 2$, clearly showing the x- and y- intercepts, as well as the vertex.

16.[10 points]
a) If $4^{-x} = 7$, what is 4^{2x} equal to?
b) If $2^x = 3$, what is 4^{-x} equal to?