

College Algebra II (Math 010) Fall 2012 Final Exam
Howard University Department of Mathematics
December 4, 2012

Name: _____

Do all of the following problems. Show all your work on the blue-book provided. No work, No credit. Good Luck!

TIME ALLOTTED: 2 hrs.

20points 1. Given the following matrices $A = \begin{bmatrix} 3 & -6 \\ -2 & 4 \end{bmatrix}$, $B = \begin{bmatrix} -2 & -5 \\ 2 & 3 \end{bmatrix}$ $C = \begin{bmatrix} 1 & -3 & 0 \\ 2 & -1 & 1 \end{bmatrix}$

Find:

(a) $A + B$ and $A - 5B$

(b) AC and CA

20points 2. Given the following system of equations:
$$\begin{cases} 2x + 4y + z = 7 \\ -x + y - z = 0 \\ x + 4y = -2 \end{cases}$$

(a) Write the Augmented Matrix of the system.

(b) Use any method to solve the system.

20points 3. (a) Graph the feasible region described by the following constraints:

$$x \geq 0, \quad y \geq 0, \quad 6x + 8y \leq 48, \quad y \leq 4, \quad x \leq 7.$$

(b) Find the maximum and the minimum values of the objective function $P(x, y) = 17x - 3y + 60$ over the feasible region of part (a.)

20points 4. For the rational function $R(x) = \frac{2x + 4}{x^2 - 5x - 6}$

(a) Find the horizontal and vertical asymptotes (if any)

(b) Find the x and y intercepts (if any)

(c) State the domain.

20points 5. For the parabola given by the equation $2x + y^2 + 8y + 8 = 0$

(a) Find the vertex, focus, equation of directrix and end points of latus rectum.

(b) Sketch the graph labeling the vertex, focus, and endpoints of the latus rectum.

10points 6. Use Cramer's Rule **ONLY** to solve the system
$$\begin{cases} x + 2y = 8 \\ 3x - 2y = 1. \end{cases}$$

10points 7. Calculate the determinants and inverses (if they exist) of $A = \begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 2 \\ -2 & -2 \end{bmatrix}$

10points 8. Find the determinant of the following 3×3 matrix: $\begin{bmatrix} 2 & 4 & 1 \\ -1 & 1 & -1 \\ 1 & 4 & 0 \end{bmatrix}$

- 10points 9. (a) Find an equation for the parabola that has its vertex at the origin and directrix, $y = 6$.
(b) Find the equation of an ellipse with foci at $(\pm 4, 0)$ and vertices at $(\pm 5, 0)$.

- 10points 10. For the ellipse given by: $9x^2 + 4y^2 = 36$
(a) Find the center, length of the major axis and length of minor axes, the vertices, Foci, and the end points of the minor axis.
(b) Sketch the ellipse labeling the vertices, foci and end points of the minor axis.

- 10points 11. Solve the following equations:
(a) $\ln(2 - x) = 3$.
(b) $\log_2 x + \log_2(x + 2) = 3$.

- 10points 12. A sum of \$1000 is invested at an interest rate of 4% per year. How long will it take for the amount to grow to \$5000 if interest is compounded continuously.

- 10points 13. If $\log x = 2$ and $\log y = \frac{1}{2}$, find
(a) $\log(x^2y)$
(b) $\log\left(\frac{x^3}{y^2}\right)$

- 10points 14. For the arithmetic sequence: $7, 4, 1, \dots$
(a) Find the formula for the n^{th} term a_n and the 17th term of the sequence.
(b) Find the sum of the first 10 terms.

- 10points 15. For the geometric sequence: $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}, \dots$
(a) Find the common ratio and the formula for the n^{th} term a_n .
(b) Find the sum of the first 10 terms.