Mathematics Department College Algebra II Final Examination Spring 2007

Name _____ ID _____ Sec. _____

You must submitt this paper and the blue book

Part I: Multiple choice questions 1 through 12.

01. [ ] Let $a = \log_{10} 2, b = \log_{10} 3$, then $\log_{72} 5 =$
(A) $\frac{a+1}{3a-2b}$ (B) $\frac{b+1}{2a+3b}$ (C) $\frac{1-b}{3a-2b}$ (D) $\frac{1-a}{3a+2b}$ (E) $\frac{1-a}{3a-2b}$

02. [ ] Solve $\log_5(x^2+4x+4) = 2$. Choose true statement: (A) $x = 2$ is the only solution
(B) there are two solutions, 2 and 7 (C) there are two solutions, -3 and 7
(D) the sum of the solutions is -4 (E) the product of the solutions is 20

03. [ ] Solve $\pi^{(1-x)} = e^x$, then $x =$
(A) $\frac{\ln \pi}{1-\ln \pi}$ (B) $\frac{\ln \pi}{1+\ln \pi}$ (C) $\frac{1+\ln \pi}{1-\ln \pi}$ (D) $\frac{e \ln \pi}{e-\ln \pi}$ (E) $\frac{1+\ln \pi}{\ln \pi}$

04. [ ] Solve $\ln(\ln(\ln x)) = 1$, then $x =$ (A) e^{e^e} (B) 2^{2^2} (C) $10^{10^{10}}$ (D) e (E) 81.1957

05. [ ] The coefficient of a^3b^5 in the expansion of $(a+2b)^8$ equals
(A) 2179 (B) 1279 (C) 2971 (D) 1792 (E) 1279

06. [ ] How many sets of solution are there for the system $\begin{cases} \sqrt{3}x^2 + 4y^2 = 4 \\ x^2 = -y + 1 \end{cases}$
(A) 0 (B) 1 (C)2 (D) 3 (E) 4

07. [ ] Solve $3^{2x-1} - 84 \times 3^{x-3} + 1 = 0$, then $x =$ (A) $-1, 2$ (B) $1, -2$ (C) $-1, -2$ (D) $1, 2$ (E) $-1, 1$

08. [ ] If $\log_2 m = x$ and $\log_2 n = y$, then $mn =$?
(A) 2^{x+y} (B) 2^{xy} (C) 4^{x+y} (D) 4^{xy} (E) 2^{x-y}

09. [ ] Find equations of the asymptotes of $-x^2 + 4y^2 - 2x - 16y + 11 = 0$ (A) $y = \frac{x}{2} + \frac{7}{2}, y = \frac{-x}{2} + \frac{7}{2}$
(B) $y = \frac{x}{3} + \frac{5}{3}, y = \frac{-x}{3} + \frac{5}{3}$ (C) $y = x + \frac{5}{2}, y = -x + \frac{5}{2}$
(D) $y = \frac{x}{2} + \frac{5}{2}, y = \frac{-x}{2} + \frac{5}{2}$ (E) $y = \frac{x}{2} - \frac{5}{2}, y = \frac{-x}{2} - \frac{5}{2}$

10. [ ] Find an equation of the directrix of parabola with vertex at $(-2, 3)$ and focus at $(0, 3)$.
(A) $x = 4$ (B) $x = -4$ (C) $y = -4$ (D) $x + y = 4$ (E) $x - y = 4$

11. [ ] Find an equations for the ellipse centered at $(2, -3)$, one focus at $(3, -3)$, and one vertex at $(5, -3)$
(A) $\frac{(x-2)^2}{9} + \frac{(y+3)^2}{8} = -1$ (B) $\frac{(x-2)^2}{9} + \frac{(y+3)^2}{8} = 2$
(C) $\frac{(x-2)^2}{9} + \frac{(y+3)^2}{8} = 1$ (D) $\frac{(x-2)^2}{8} + \frac{(y+3)^2}{9} = 1$ (E) $\frac{(x-2)^2}{3} + \frac{(y+3)^2}{2\sqrt{3}} = 1$

12. [ ] Find an equations for the hyperbola centered at $(1, -2)$, one focus at $(4, -2)$, and one vertex at $(3, -2)$
(A) $\frac{(x-1)^2}{4} - \frac{(y+2)^2}{5} = 1$ (B) $\frac{(x-1)^2}{4} - \frac{(y+2)^2}{5} = -1$
(C) $\frac{(x+1)^2}{4} - \frac{(y+2)^2}{5} = 1$ (D) $\frac{(x-1)^2}{4} - \frac{(y-2)^2}{5} = 1$ (E) $\frac{(x-1)^2}{16} - \frac{(y+2)^2}{25} = 1$

Part II: For questions 13 through 20, show details and circle the final answer for each on the blue book. Start each problem with a fresh page.

13. Solve the system of inequalities:
$$\begin{cases} x \leq 0 \\ y \leq 0 \\ 2x + y \leq 6 \\ x + 2y \leq 6 \end{cases}$$

14. Compute the mutliplication of matrices $\begin{pmatrix} 1 & -1 & -1 \\ -1 & 1 & -1 \\ 1 & -1 & \sqrt{2} \end{pmatrix} \begin{pmatrix} 0 & 2 & -1 \\ -1 & 0 & 1 \\ 3 & \sqrt{3} & 1 \end{pmatrix}$

15. Solve the system $\begin{cases} 4x + 5y = 2 \\ 6x - 7y = 10 \end{cases}$ by Cramer's rule.

16. Solve the system $\begin{cases} x + 2y - z = 0 \\ -2x - 4y + z = -8 \\ x - y = -1 \end{cases}$ by any method.

17. Find the sum of $1 + \frac{1}{3} + \frac{1}{9} + ...$

18. Find the sum of $2 + 5 + 8 + ... + 41$.

19. Let $A = \{1, 3, 5, 8\}, B = \{3, 5, 7\}, C = \{2, 4, 6, 8\}$. Find: $(i) A \bigcup B, (ii) A \bigcap B, (iii) B \bigcap (A \bigcup C)$.

20. The population of a city follows the exponential law. If the population doubled in a 18-month period and current population is 100, what will the population be 2 years from now?