Final Examination
Mathematics 1320 and 1420
May 6, 2011

Answer each of the multiple choice questions on the exam by marking the correct answer. The two questions that require complete answers must be answered in your blue book. Follow the instructions of your instructor.

Name_____

21 Multiple Choice Questions

1. Solve: $3x^2 - x - 3 = 0$

   (a) $\frac{1 \pm \sqrt{37}}{-6}$

   (b) $\frac{1 \pm \sqrt{38}}{2}$

   (c) $\frac{1 \pm \sqrt{37}}{6}$

   (d) $\frac{-1 \pm \sqrt{-39}}{2}$

   (e) $\frac{-5 \pm \sqrt{-39}}{2}$

2. Perform the indicated operation and write the result in standard form.
   $\frac{1+i}{1-i}$

   (a) i

   (b) $-i$

   (c) $\frac{i}{2}$

   (d) -1

   (e) 1

3. Solve the equation $\log_2(2x - 1) = 3$ for x.

   (a) $x = \frac{9}{2}$

   (b) $x = 5$

   (c) $x = \frac{1}{2}$

   (d) $x = \frac{3}{2}$

4. Let $f(x) = x^2$, and $g(x) = 1 + x$
   Compute, $(f \circ g)(x)$

   (a) x^2

   (b) $x^2 + 1$

   (c) $(1 + x)^2 + 1$

   (d) $(1 + x)^2$

5. I am rolling a pair of dice. What is the probability that I will roll a 7 before I roll a 10?

   (a) $1/12$

   (b) $1/6$

   (c) $2/3$

   (d) $1/2$

6. Find the partial fraction decomposition of $\frac{x+1}{x(x-1)^2}$

    (a) $\frac{1}{x} - \frac{1}{(x-1)} + \frac{2}{(x-1)^2}$

    (b) $\frac{1}{x} + \frac{2}{(x-1)} + \frac{2}{(x-1)^2}$

    (c) $\frac{1}{x} - \frac{10}{(x-1)} + \frac{2}{(x-1)^2}$

    (d) $\frac{-1}{x} - \frac{1}{(x-1)} + \frac{2}{(x-1)^2}$

7. The formula for area of a triangle is $A = \frac{1}{2}bh$. Solve this equation for b.

    (a) $b = \frac{1}{2}Ah$

    (b) $b = \frac{2A}{h}$

    (c) $b = \frac{2h}{A}$

    (d) $b = \frac{A}{2h}$

8. The bus fare in a city is \$1.50. People who use the bus have the option of purchasing a monthly coupon book for \$25.00. With the coupon book, the fare is reduced to \$0.50. Determine the number of times in a month the bus must be used so that the total monthly cost without the coupon book is the same as the total monthly cost with the coupon book.

    (a) 20

    (b) 25

    (c) -25

    (d) 15

    (e) None of the above.

9. Solve for x
$$\frac{6}{x+3} - \frac{5}{x-2} = \frac{-20}{x^2 + x - 6}$$

    (a) 7

    (b) 4

    (c) $\frac{7}{2}$

    (d) $\frac{9}{2}$

10. Solve the following absolute value inequality and use interval notation to express the solution set.
$$|2x - 6| < 8$$

    (a) $(-\infty, -1) \cup (7, +\infty)$

    (b) $(-1, 7)$

    (c) $[-1, 7]$

    (d) $(-\infty, -1) \cap (7, +\infty)$

11. Write an equation of the line passing through $(5, -9)$ and perpendicular to the line whose equation is $x + 7y - 12 = 0$.

    (a) $y = 7x - 44$

    (b) $y = 7x - 26$

    (c) $y = -\frac{1}{7} + 9$

    (d) $y = -7x + 44$

12. What is the domain of the function $g(x) = \sqrt{x-3}$?

   (a) $(3, \infty)$

   (b) $[-3, \infty)$

   (c) $[3, \infty)$

   (d) $(-\infty, 3)$

13. Solve:

$$
\begin{aligned}
4x^2 + y^2 &= 13 \\
x^2 + y^2 &= 10
\end{aligned}
$$

   (a) $(1, 3)$

   (b) $(1, 3), (1, -3), (-1, 3), (-1, -3)$

   (c) $(3, 1), (-3, -1), (-3, 1), (-3, -1)$

   (d) No Solution

14. The function $x^2 - 2x + 4$ is:

   (a) Odd

   (b) Even

   (c) Neither even, nor odd

   (d) Both even and odd

15. The perimeter of a rectangular table top is 34 feet. The difference between 4 times the length and 3 times the width is 33. Find its length.

   (a) $L = 10$

   (b) $L = 8$

   (c) $L = 6$

   (d) $L = 12$

16. Solve the system of equations

$$
\begin{aligned}
5x + 2y + z &= -25 \\
5x - 3y - z &= -23 \\
3x + y + 2z &= -9
\end{aligned}
$$

   (a) $\{(-2, -5, 4)\}$

   (b) $\{(4, -3, -5)\}$

   (c) $\{(-5, 4, -2)\}$

   (d) $\{(-5, -2, 4)\}$

17. A password consists of four different letters of the alphabet where no letter is used more than once. Which formula gives the number of possible passwords?

   (a) $_4C_{26}$

   (b) $_{26}C_4$

   (c) $_4P_{26}$

   (d) $_{26}P_4$

18. The equation of the line passing through $(-2, 5)$ whose slope equals to 6 is given by,

   (a) $y = 6x + 5$

   (b) $6y = -2x + 5$

   (c) $y - 5 = 6(x + 2)$

   (d) $x - 5 = 6(y + 2)$

   (e) $x = 6y + 5$

19. Prehistoric cave paintings were discovered in a cave in France. The paint contained 15% of the original *carbon* – 14. By assuming that the exponential decay model for *carbon* – 14 is $A = A_0 e^{-0.000121t}$, compute the age of the paintings.

   (a) Approximately 15,679 years old

   (b) Approximately 22,380 years old

   (c) Approximately 1,343 years old

   (d) Approximately 14,335 years old

   (e) Cannot be determined by the given information

20. Let x represent one number and y represent another number. The sum of 7 times the first number and three times the second number is 20. If the second number is subtracted from twice the first number, the result is 5. Write a system of equations to find the two numbers.

   (a)

$$7x + 3y = 20$$
$$y - 2x = 5$$

   (b)

$$7x + 3y = 20$$
$$2x - y = 5$$

   (c)

$$x + y = 20$$
$$y - x = 5$$

   (d)

$$7x - 3y = 20$$
$$y - 2x = 5$$

21. The sum of the x-variable and the y-variable is at most 3. The y-variable added to the product of four and the x-variable does not exceed 6. Write a system of inequalities to find the two variables.

   (a) $x + y < 3 \quad y + 4x < 6$
   (b) $x + y \geq 3 \quad y + 4x \leq 6$
   (c) $x + y \leq 3 \quad y + 4x \geq 6$
   (d) $x + y \leq 3 \quad y + 4x \leq 6$

2 problems to be worked in your blue book

22. Find the distance from the line $x + y = 1$ tot he point $(2.5, 2.5)$ by solving the following problems:

   (a) find the line that is perpendicular to the line $x + y = 1$ and passes through the point $(2.5, 2.5)$.

   (b) find the intersection of the line you just found with $x + y = 1$.

   (c) find the distance from the point you just found to the point $(2.5, 2.5)$

23. If it takes Jane two hours to mow the lawn and it takes her brother three hours to do the same job how long will it take if they work together efficiently?