

Section:

Name:

Student ID Number:

## Math 1031

### Final Exam

December 15, 2000

3 hours

*Closed book, closed notes. Simple calculators are allowed. Work all problems.*

*The first 18 problems are multiple choice. Please mark the correct answer with a number 2 pencil on the separate answer sheet provided. Only the correct answer will receive credit -- there is no partial credit.*

*Problems 19-24 are free response. Please work the problem in the space provided and show all work. Partial credit will be given. A correct answer may receive less than full credit if the work is incomplete or incorrect.*

*Please write your name on every page.*

| <b>Problem</b> | <b>Score</b> | <b>Possible</b> |
|----------------|--------------|-----------------|
| <b>1-18</b>    |              | <b>144</b>      |
| <b>19</b>      |              | <b>20</b>       |
| <b>20</b>      |              | <b>20</b>       |
| <b>21</b>      |              | <b>32</b>       |
| <b>22</b>      |              | <b>30</b>       |
| <b>23</b>      |              | <b>24</b>       |
| <b>24</b>      |              | <b>30</b>       |
| <b>Total</b>   |              | <b>300</b>      |

- (8) 1. Suppose that you flip a fair coin four times and then roll a fair die three times. What is the probability that you will get the sequence H-H-H-H-3-2-1?

a.  $\frac{1}{2^4 \cdot 6 \cdot 5 \cdot 4}$

b.  $\frac{1}{2^4 \cdot 6^3}$

c.  $\frac{1}{2^4} + \frac{1}{6^3}$

d.  $\frac{1}{4 \cdot 2 \cdot 3 \cdot 6}$

e.  $\frac{1}{4 \cdot 2} + \frac{1}{3 \cdot 6}$

- (8) 2. Suppose you invest \$5000 compounded continuously at a rate of 7% annual interest. After  $T$  years you have \$10,000. Which correctly expresses  $T$ ?

a.  $\ln\left(\frac{2}{0.07}\right)$

b.  $\frac{\ln 2}{0.07}$

c.  $\frac{\ln 0.5}{0.07}$

d.  $0.07 \cdot \ln 2$

e. none of the above

- (8) 3. What is the solution of  $\frac{1}{2y+3} = \frac{4}{5y+6}$ ?

a. There is no solution.

b.  $y = \frac{1}{2}$

c.  $y = -2$

d.  $y = 2$

e. none of the above

(8) 4. What is the solution of the following system?

$$5x + 3y = 3$$

$$3x + 2y = 1$$

a. There is no solution.

b.  $(x, y) = \left(\frac{2}{3}, -\frac{1}{2}\right)$

c.  $(x, y) = \left(\frac{2}{3}, -\frac{1}{9}\right)$

d.  $(x, y) = (3, -4)$

e. none of the above

(8) 5. What is the slope of the line passing through the points  $(2, -1)$  and  $(-1, 1)$ ?

a.  $-2$

b.  $-1$

c.  $-\frac{2}{3}$

d.  $\frac{2}{3}$

e.  $1$

(8) 6. Which answer describes the solution of  $|1 - 3x| > 1$ ?

a.  $x > \frac{2}{3}$

b.  $x < \frac{2}{3}$

c.  $0 < x < \frac{2}{3}$

d.  $x < 0$  or  $x > \frac{2}{3}$

e.  $x = 0$

- (8) 7. A total of \$30,000 was invested in two funds paying 6% and 7% simple annual interest. If \$2050 in interest was earned after one year, how much was invested in each fund?
- a. \$25,000 @ 6% and \$5,000 @ 7%
  - b. \$20,000 @ 6% and \$10,000 @ 7%
  - c. \$15,000 @ 6% and \$15,000 @ 7%
  - d. \$10,000 @ 6% and \$10,000 @ 7%
  - e. \$5,000 @ 6% and \$25,000 @ 7%
- (8) 8. What are the real solutions of  $x^2 + 4x - 12$ ?
- a. No real solution.
  - b.  $x = 2$
  - c.  $x = 2$  and  $x = -6$
  - d.  $x = 6$  and  $x = -2$
  - e.  $x = 6$
- (8) 9. You flip three fair coins. What is the probability that all three show heads, given that at least one is a head?
- a.  $\frac{1}{8}$
  - b.  $\frac{1}{7}$
  - c.  $\frac{1}{6}$
  - d.  $\frac{1}{4}$
  - e.  $\frac{1}{3}$

(8) 10. Which answer is equal to  $\ln(12^2)$ ?

- a.  $\ln(12) \cdot \ln(12)$
- b.  $(\ln(12))^2$
- c.  $\ln(2) \cdot \ln(12)$
- d.  $12e^2$
- e.  $4\ln(2) + 2\ln(3)$

(8) 11. What is the maximum value of the function  $f(x) = 2 - 6x - 3x^2$ ?

- a. -2
- b. -1
- c. 2
- d. 3
- e. 5

(8) 12. Suppose that  $g$  is a function whose graph contains the following points  $(1, 2)$ ,  $(2, 3)$ , and  $(3, 2)$ . What is  $g^{-1}(2)$ ?

- a. 1
- b. 2
- c. 3
- d.  $g^{-1}$  does not exist.
- e. none of the above

- (8) 13. You have a one dollar bill, a five dollar bill, and a ten dollar bill. How many ways can you hand out all the bills to six people, if anyone can get any number of bills?
- a.  $P(6,3)$
  - b.  $C(6,3)$
  - c.  $6^3$
  - d.  $3^6$
  - e. none of the above

- (8) 14. What is the solution of  $x^2 < 3x + 4$ ?
- a.  $x < 2$
  - b.  $x > 4$
  - c.  $x < -1$
  - d.  $-1 < x < 4$
  - e.  $x > 4$  and  $x < -1$

- (8) 15. If  $f(x) = \frac{1}{x^2}$  and  $g(x) = x^2 - 1$ , what is  $g(f(x))$ ?
- a.  $\frac{x^2 - 1}{x^2}$
  - b.  $x^2 - \frac{1}{x^2}$
  - c.  $\frac{1}{(x^2 - 1)^2}$
  - d.  $\frac{1}{x^4} - 1$
  - e. 0

(8) 16. What is the equation of the line with slope 2 passing through the point  $(-3, -5)$ ?

- a.  $y = 2x + 1$
- b.  $y = 2x - 5$
- c.  $y = 2x + 5$
- d.  $y = 2x - 3$
- e.  $y = 2x + 3$

(8) 17. Which of the following parabolas has vertex  $(2, -3)$ ?

- a.  $y = x^2 - 4x + 1$
- b.  $y = x^2 - 4x + 7$
- c.  $y = x^2 - 2x - 3$
- d.  $y = x^2 + 4x + 1$
- e.  $y = x^2 + 4x + 7$

(8) 18. You flip a fair coin six times. What is the probability of getting at least two heads?

- a.  $\frac{3}{32}$
- b.  $\frac{7}{64}$
- c.  $\frac{1}{3}$
- d.  $\frac{57}{64}$
- e.  $\frac{29}{32}$

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(20) **19.** Find the inverse of the function  $f(x) = \frac{x}{3x-2}$ .



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(20) **20.** Consider the circle equation  $9x^2 + 9y^2 - 6x + 24y + 1 = 0$ .

(15) **a.** Find the standard form of the equation.

(5) **b.** Find the radius and center, and sketch the graph.

(32) **21.** Suppose that you draw 3 cards from a standard deck of 52 cards. What is the probability of getting:

(8) **a.** exactly one ace?

(8) **b.** exactly two aces?

(8) **c.** no aces?

(8) **d.** exactly three clubs?

(30) **22.** Consider the following system of equations:

$$x + 6y + 4z = 9$$

$$8x + 7y + z = 11$$

$$x + y + z = 0$$

(20) **a.** Put these equations into row-echelon form.

(10) **b.** Back-substitute to find the solution.

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- (24) **23.** You decide to play the following game. You draw one card from a standard deck of 52 cards. If you draw an ace, you win \$20. If you draw a face card, you win \$10. If you draw any other card, you lose the amount in dollars shown on the card. (I.e., if you draw a 7, you lose \$7.) What is the expected value of this game?

(30) **24.** Solve for x:

(10) **a.**  $x^4 - 3x^2 - 4 = 0$

(10) **b.**  $2^{2x} - 3 \cdot 2^x - 4 = 0$

(10) **c.**  $\log_2 x + \log_2(x-3) = 2$