

February 24, 1997

This is a green test and your TA's name is Gary; your lab section number is L\_\_\_\_\_

Your name \_\_\_\_\_

The first 15 problems count 6 points each and the final 2 count 30 points (10 and 20, respectively)

1. Fill in the four character code you received via email in the box

Multiple choice section. Circle the correct choice. You do not need to show your work on these problems.

2. How many of the first 11 lectures did you attend? Please answer truthfully. Every answer will be counted as correct.

(A) fewer than 4    (B) 4 or 5    (C) 6 or 7    (D) 8 or 9    (E) 10 or 11

3. The value of  $(2 - 3(2 - 3)^{-1})^{-1}$  is

(A)  $-5$     (B)  $-\frac{1}{5}$     (C)  $\frac{1}{5}$     (D)  $\frac{5}{3}$     (E)  $5$

4. If  $\frac{1}{x} - \frac{1}{y} = \frac{1}{z}$ , then  $z =$

(A)  $y - x$     (B)  $x - y$     (C)  $\frac{y - x}{xy}$     (D)  $\frac{xy}{y - x}$     (E)  $\frac{xy}{x - y}$

5. It takes Huck Finn 6 hours to make the trip from Baton Rouge to New Orleans by raft along the Mississippi. It takes Captain Moonbeam 2 hours to make the same **down river** trip. How long would it take Captain Moonbeam to make the trip up river from New Orleans to Baton Rouge?

(A) 2 hours    (B)  $2\frac{1}{2}$  hours    (C) 3 hours    (D) 4 hours    (E) 6 hours

6. In some countries, money lenders charge desperate borrowers as much as 10% **DAILY** interest. Which of the following is closest to the amount you would owe after a year if you borrowed \$1 under these conditions?

(A) \$128    (B) \$12,800    (C) \$1.28 million  
(D) \$1.28 billion    (E) \$1,280 trillion

7. What is the sum of all the real numbers  $x$  that satisfy

$$||x - 3| - 5| = 7?$$

(A) 0    (B) 4    (C) 5    (D) 6    (E) 7

8. The cube of  $2^{\sqrt{2}}$  equals

(A)  $2^3$     (B)  $8^{\sqrt{2}}$     (C)  $8^2$     (D)  $8^{2\sqrt{2}}$     (E)  $8^{\sqrt{2}^2}$

9. The inequality  $2 - (3 - 4) \neq (2 - 3) - 4$  shows that subtraction is not

(A) associative    (B) distributive    (C) commutative  
(D) subtractive    (E) multiplicative

10. The length of a rectangular garden is 5 feet longer than its width. Which of the following is an algebraic expression for the perimeter of the garden if the width is  $x$  feet?

(A)  $x(x + 5)$     (B)  $2x + 2(x + 5)$     (C)  $2x + 2(5x)$   
(D)  $2x + 2x + 5$     (E)  $2x + 2(x - 5)$

11. What is the probability of selecting an E when a letter from the word C O L L E G I A T E is selected at random?
- (A) 0.1    (B)  $\frac{1}{8}$     (C) 0.2    (D)  $\frac{1}{4}$     (E)  $\frac{1}{3}$
12. Tom is three years older than Sue. The sum of their ages is 15. Given that Tom's age is  $x$  years, which of the equations could be solved to find  $x$ ?
- (A)  $x = 15 - 3$     (B)  $x + (x - 3) = 15$     (C)  $x + 3x = 15$   
(D)  $x + (x + 3) = 15$     (E)  $x = 15 + (x - 3)$
13. The numbers  $b$  and  $c$  satisfy  $b^2 + 12c = 0$ . Use this fact to describe the nature of the solutions of  $3x^2 - bx - c = 0$ .
- (A) no real solutions    (B) one real (repeated) solution  
(C) two real solutions    (D) one imaginary solution  
(E) two imaginary solutions
14. For what values of  $x$  is  $\sqrt{x^2} = -x$ ?
- (A) no real numbers    (B) all real numbers    (C) non-negative real numbers  
(D) non-positive real numbers    (E) only zero
15. What is the product of the roots of  $(x - 1)(x - 2) + (x - 2)(x - 5) = 0$ ?
- (A) 2    (B) 6    (C) 10    (D) 12    (E) 20

On both the following questions, **show your work**.

16. Construct a rectangle diagram which shows geometrically that  $(x+1)(x+2) = x^2 + 3x + 2$ .

17. Consider the fragment of programming code below:

```
If  $X < 5$  then  $X := 2 * X - 8$  else  $X := X - 4$ ;  
If  $X < 7$  then  $X := X + 5$  else  $X := X * X$ 
```

Suppose  $X$  is a real variable.

(a) Find two functions  $f$  and  $g$  which describe the effect of each **If then else** statement on variable  $X$ .

(b) Now use the functions from part (a) to find the effect on  $X$  of the *entire* fragment of code.