

**College Algebra – Strange Operations**

16. Among the following arithmetic operations, which could the symbol  $\diamond$  represent given that the equation  $(2 \diamond 1)^4 + (6 \diamond 3)^2 = 10$  is true?
- I. Addition
  - II. Subtraction
  - III. Division
- F. I only  
G. II only  
H. III only  
J. I and II only  
K. I, II, and III
11. Charles defined a new operation,  $\blacklozenge$ , on pairs of ordered pairs of integers as follows:  $(a,b) \blacklozenge (c,d) = \frac{ac + bd}{ab - cd}$ .  
What is the value of  $(2,1) \blacklozenge (3,4)$ ?
- A. -2
  - B. -1
  - C. 2
  - D. 5
  - E. 10
31. The operation  $\otimes$  is defined as “cube the number that is to the left of  $\otimes$  and add the result to the number that is to the right of  $\otimes$ .” What is the value of  $2 \otimes (4 \otimes 5)$ ?
- A. 40
  - B. 77
  - C. 160
  - D. 640
  - E. 1,733
18. The operation  $C @ D$  is defined as  $C + 2D$ . What is the value of  $6 @ 5$ ?
- F. 16
  - G. 17
  - H. 18
  - J. 22
  - K. 60

48. Let  $x \oplus y = (x - y)^3$  for all integers  $x$  and  $y$ . Which of the following is the value of  $3 \oplus (-2)$  ?

- F. 1
- G. 19
- H. 35
- J. 125
- K. 216

49. For all positive integers  $n$ , which of the following is a correct ordering of the terms  $n^n$ ,  $(n!)^n$ , and  $(n!)^{n!}$  ?

(Note:  $n! = (n)(n - 1)(n - 2) \cdots (2)(1)$  )

- A.  $n^n \geq (n!)^n \geq (n!)^{n!}$
- B.  $(n!)^n \geq n^n \geq (n!)^{n!}$
- C.  $(n!)^n \geq (n!)^{n!} \geq n^n$
- D.  $(n!)^{n!} \geq (n!)^n \geq n^n$
- E.  $(n!)^{n!} \geq n^n \geq (n!)^n$

59. If  $\frac{n!}{(n-2)!} = 30$ , then  $(n-1)! = ?$

- A. 15
- B. 24
- C. 60
- D. 120
- E. 720

8. The operation  $A @ B$  is defined as  $A + 2B$ . What is the value of  $12 @ 4$  ?

- F. 20
- G. 28
- H. 32
- J. 36
- K. 96