1

If x and y are positive integers greater than 1 such that x – y and x/y are both even integers, which of the following numbers must be non-prime integers?

I. x
II. x + y
III. y/x

(A) I only
(B) II only
(C) III only
(D) I and II
(E) I, II and III

2

Which of the following numbers is not prime? (Hint: avoid actually computing these numbers.)

A. 6!-1
B. 6!+21
C. 6!+41
D. 7!-1
E. 7!+11

3

For any integer k > 1, the term “length of an integer” refers to the number of positive prime factors, not necessarily distinct, whose product is equal to k. For example, if k = 24, the length of k is equal to 4, since 24 = 2 × 2 × 2 × 3. If x and y are positive integers such that x > 1, y > 1, and x + 3y < 1000, what is the maximum possible sum of the length of x and the length of y?

A. 5
B. 6
C. 15
D. 16
E. 18

4

If y is the smallest positive integer such that 3,150 multiplied by y is the square of an integer, then y must be

A. 2
B. 5
C. 6
D. 7
E. 14