1. If x and y are positive integers such that x divided by 7 leaves a remainder of 4, and y divided by 7 leaves a remainder of 3, then what is the remainder when xy is divided by 7?

   (A) 0
   (B) 1
   (C) 3
   (D) 5
   (E) 6

2. The radius of a sphere with volume 35 is how much greater than the radius of a sphere with volume 24?

   (A) 0.58
   (B) 0.49
   (C) 0.37
   (D) 0.24
   (E) 0.12

3. If S is the set of all integers that can be written in the form $n^2 + 1$, then which of the following is a member of S?

   (A) 8
   (B) 16
   (C) 24
   (D) 52
   (E) 65

4. A group of students consisting of 4 seniors, 5 juniors, and 6 sophomores plans to nominate a slate of 3 officers—president, vice–president, and treasurer—for the student government election. If the presidential candidate must be a senior and the vice–presidential candidate must be a junior, how many different slates are possible?

   (A) 3,375
   (B) 840
   (C) 300
   (D) 260
   (E) 120

5. If $f(x) = x^2 + bx + 1$, and if $f(1) = 4$, then $b =$

   (A) 4
   (B) 2
   (C) 1
   (D) 0
   (E) –2

6. Points P and Q lie in the coordinate plane. If the coordinates of P are (5,3) and Q are (–2, –6), what is the distance between point P and point Q?

   (A) 11.4
   (B) 13.2
   (C) 15.8
   (D) 17.5
   (E) 21.2

7. During the last 4 hours of a 400–kilometer trip, a passenger train traveled at an average speed of t kilometers per hour. If the train completed the entire trip in 6 hours, at what speed, in kilometers per hour, did the train travel during the first 2 hours?

(A) $\dfrac{200+t}{2}$

(B) $\dfrac{200-t}{2}$

(C) $200+t$

(D) $200-2t$

(E) $2t-100$

B

A θ φ C
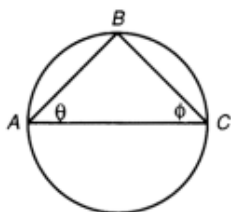
8. In the above figure, if AC is a diameter of the circle, B is a point on the circle, and $\sin\theta = 1/2$, then $\sin\phi =$

(A) $\dfrac{\sqrt{2}}{3}$

(B) $\dfrac{\sqrt{3}}{3}$

(C) $\dfrac{\sqrt{3}}{2}$

(D) $\dfrac{2\sqrt{2}}{3}$

(E) $\dfrac{2\sqrt{3}}{3}$

9. If an equilateral triangle is rotated 360° around one of its altitudes, the resulting solid is a

(A) cone
(B) cube
(C) cylinder
(D) sphere
(E) right prism

10. How many integers are in the solution set of $|3x - 2| < 1$?

(A) None
(B) One
(C) Two
(D) Three
(E) Infinitely many

11. If $f(x,y) = x^2 - xy + y^2$, for all real numbers, then which of the following must be true?

(A) $f(x,y) = f(x,-y)$
(B) $f(x,y) = f(-x,y)$
(C) $f(x,y) = f(-x, -y)$
(D) $f(x,y) = f(x,1/y)$
(E) $f(x,y) = f(x, -1/y)$

12. If $f(x)\ \dfrac{x-2}{(x+2)(4+x^2)}$, for what value of x is $f(x)$ undefined?

(A) -4
(B) -2
(C) 0
(D) 2
(E) 4

13. An angle measure of 45° is equivalent to an angle measure of

(A) $\dfrac{1}{4}$ radians

(B) $\dfrac{1}{\pi}$ radians

(C) $\dfrac{\pi}{4}$ radians

(D) $\dfrac{\pi}{2}$ radians

(E) π radians

14. If $\cos x = 0.2586$ and $0 < x < \dfrac{\pi}{2}$, what is the value of x?

(A) 8.254
(B) 1.309
(C) 0.999
(D) 0.688
(E) 0.005

1. D 2. D 3. E 4. D 5. B 6. A 7. D 8. C 9. A 10. A 11. C 12. B 13. C 14. B