MOCK BOARD IN MATHEMATICS (B)

1) A couple plans to have 7 children. Find the probability of having at least one girl.
   a) 0.9922
   b) 0.8822
   c) 0.7722
   d) 0.6622

2) What is the apothem of a rectangular polygon having an area of 225 square units and a perimeter of 60 units?
   a) 6.5
   b) 7.5
   c) 5.5
   d) 8.5

3) A 12-ft high flagpole is standing vertically at the edge of the roof of a building. The angle of elevation of the top of the pole from a point on the ground that is 64 ft from the base of the building is 78° and 50'. Find the height of the building.
   a) 112.2 ft
   b) 212.2 ft
   c) 312.2 ft
   d) 412.2 ft

4) A solid consists of a hemisphere surmounted by a right circular cone. Find the vertical (or vertex) angle of the cone if the volumes of the conical and the spherical portions are equal.
   a) 50.13°
   b) 51.13°
   c) 52.13°
   d) 53.13°

5) The sum of the base and the altitude of an isosceles triangle is 36 cm. Find the altitude of the triangle if its area is to be a maximum.
   a) 16 cm
   b) 17 cm
   c) 18 cm
   d) 19 cm

6) If 5 kg of a substance is reduced to 2 kg in one hour, when was half of it decomposed?
   a) 0.86 hr
   b) 0.76 hr
   c) 0.66 hr
   d) 0.56 hr

7) Find the area bounded by $y = \sqrt{9-x}$, x = 5, x = 8 and y = 0.
   a) 14/3
   b) 13/3
   c) 11/3
   d) 10/3

8) If the sum of the squares of 5 numbers is 130 and their standard deviation is equal to the square root of 2.96, find their arithmetic mean.
   a) 4.9
   b) 4.8
   c) 4.7
   d) 4.6

9) Find the altitude of a star at 5:50 P.M. at a point whose latitude is 40°45' if the star's declination is 23°48'.
   a) 16°19'
   b) 17°20'
   c) 18°13'
   d) 19°22'

10) What is the probability of throwing a total of 8 or 11 in a single throw of a pair of dice?
   a) 0.1644
   b) 0.1744
   c) 0.1844
   d) 0.1944

11) Without expanding $(2x - x^2)^5$, find the term involving x^8.
   a) $-40x^8$
   b) $-30x^8$
   c) $-20x^8$
   d) $-70x^8$

12) A and B can dig a trench in 20 days. It would take B 9 days longer to dig it than it would take A alone. How long would it take B to dig the trench alone?
   a) 45 days
   b) 46 days
   c) 47 days
   d) 48 days

13) A boy in a swing moves an arc of 5 m in length; then back 3/5 of this distance and so on until it stops. Find the total distance traversed by the boy.
   a) 11.5 m
   b) 12.5 m
   c) 13.5 m
   d) 14.5 m

14) Find the area of one loop of the lemniscate $r^2 = 12 \sin 2\theta$.
   a) 12
   b) 6
   c) 8
   d) 24

15) The measure of each interior angle of a regular polygon is 36 degrees more than its adjacent exterior angle. How many sides have the polygon?
   a) 7
   b) 6
   c) 5
   d) 8

16) A box contains 3 red marbles and 7 white marbles. A marble is drawn from the box and the marble of the other color is then put in the box. If the second marble is drawn from the box, what are the odds in favor of getting a second red marble?
a) 15:33
b) 16:33
c) 17:33
d) 18:33

17) Find the distance from the line $4x - 3y + 15 = 0$ to the point (2,1).
a) -7
b) -6
c) -5
d) -4

18) The cost per hour of running a boat is proportional to the cube of the speed of the boat. At what speed will the boat run against a current of 8 kph in order to go a given distance most economically?
a) 15 kph
b) 14 kph
c) 13 kph
d) 12 kph

19) How many terms of the arithmetic progression 9, 11, 13, … must be added in order that the sum should equal the sum of the first nine terms of the geometric progression 3, -6, 12, -24, …?
a) 19
b) 21
c) 23
d) 22

20) The total points that the PBA Centennial Team scored in a basketball game is 96. If there were 2.5 times as many field goals as free throws, how many free throws were made?
a) 15
b) 14
c) 16
d) 12

21) Find the area of the triangle bounded by the coordinate axes and the tangent to the parabola $y = x^2$ at the point (2, 4).
a) 1
b) 2.5
c) 1.5
d) 2

22) How many four-digit odd numbers can be formed with the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 if each digit is used only once in each number?
a) 2230
b) 2240
c) 2250
d) 2260

23) Find the volume of the solid generated by revolving the area bounded by $x = y^2$ and $x = 2 - y^2$ about the y – axis.
a) 11 pi/3
b) 14 pi/3
c) 16 pi/3
d) 17 pi/3

24) If the population of a city increases by 15 per cent each year, during which year will the population triple?
a) 8th year
b) 7th year
c) 9th year
d) 10th year

25) Find the x-coordinate of the centroid of the area bounded by $x = 2y - y^2$ and the y-axis.
a) 0.39
b) 0.40
c) 0.41
d) 0.42

26) The parametric equations of a curve are $x = 2\cos\theta$ and $y = \cos 2\theta$. Give its equivalent rectangular equation.
a) $x^2 = 2(y+1)$
b) $x^2 = 2(y-1)$
c) $x^2 = 2y + 1$
d) $x^2 = 2y - 1$

27) Juan's rate of doing work is three times that of Jose. On a given day, Juan and Jose work together for 4 hours, then Jose quits and Juan finishes the rest of the job in 2 more hours. How long would it take Jose to do the job alone?
a) 19 hrs.
b) 20 hrs.
c) 21hrs.
d) 22 hrs.

28) A sphere is inscribed in a right circular cone. The slant height of the cone is equal to the diameter of its base. If the altitude of the cone is 9 cm, find the surface area of the sphere.
a) 26 pi
b) 36 pi
c) 46 pi
d) 56 pi

29) Fine the eccentricity of an ellipse whose major axis and minor axis are the radii of the circles $x^2 + y^2 = 16$ and $x^2 + y^2 = 4$ respectively.
a) 0.77
b) 0.87
c) 0.67
d) 0.97

30) To go to work, a commuter first averages 50 kph riding a bus to a train station and then rides the train which averages 60kph. The entire trip takes 1 hour and 12 minutes. It costs the commuter 27 centavos per km to ride the bus

and 30 centavos per km to ride the train. If the total cost is P18.75, find the distance traveled by the bus.
a) 21.7 km
b) 31.7 km
c) 41.7 km
d) 51.7 km

31) A man walks horizontally at a constant rate of 2 m/s toward a 24-m tower. How fast is the angle of elevation of the top of the tower changing when he is 8 m from the base of the tower?
a) 0.055 rad/s
b) 0.065 rad/s
c) 0.075 rad/s
d) 0.085 rad/s

32) A steel ball at 120°C cools in 20 minutes to 80°C in a room at 25°C. Find the temperature of the of the ball after half an hour.
a) 40.96°C
b) 45.96°C
c) 66.85°C*
d) 55.96°C

33) The base of a tetrahedron is a triangle whose sides are 10, 24 and 26 units. The altitude of the tetrahedron is 20 units. Find the area of a cross-section whose distance from the base is 15 units.
a) 4.5 sq units
b) 5.5 sq units
c) 6.5 sq units
d) 7.5 sq units

34) Evaluate $(1 + i)^8$
a) 16i
b) 16
c) -16i
d) -16

35) Suppose A = {2,4,6,8,10,12}, B = {1,4,9,16} and C = {2,10}
a) A U B = {1,2,4,6,8,9,10,12,16}
b) A U B = {4}
c) A U B = {1,2,6,8,9,10,12,16}
d) A U B = {1,4,9,16}

36) Solve for x in $\log_2 \log_3 \log_x 2 = 1$
a) X = 1/9
b) $X = (2)^{1/9}$
c) $X = (1/9)^2$
d) $X = 2^9$

37) Log x^2 – log 5x = log 20
a) X = 5
b) X = 10
c) X = 50
d) X = 100

38) if a < b and c < d, then _____
a) a + c < b - d
b) a + c < b + d
c) a + d < b + c

39) At a certain instance, the captain of the ship observed that the angle of elevation of the top of a lighthouse 50 m above the water level is 60°. After traveling directly away from the lighthouse for 5 minutes, he noticed that angle of elevation is just 30°. If the telescope is 6 m above the water line, find the velocity of the ship.
a) 0.169 m/sec
b) 50.81 m/min
c) 10.16 m/sec
d) 50.81 m/sec

40) What is the area of a sphere?
a) $4\pi D^2$
b) $4\pi R^2$
c) $2\pi D^2$
d) $2\pi R^2$

41) Suppose A = {2,4,6,8,10,12}, B = {1,4,9,16} and C = {2,10}
a) B ∩ C = {1,2,4,9,10,16}
b) B ∩ C = {0}
c) B ∩ C = 0
d) B ∩ C = {2,10}

42) What is the volume of the sphere?
a) $(3/4)\pi R^3$
b) $(4/3)\pi R^2$
c) $(3/4)\pi R^2$
d) $(4/3)\pi R^3$

43) if a < b, then a + c < b + c, and a – c < b – c if c is _____
a) subtracted from a only
b) added to b only
c) subtracted from b only
d) any real number

44) Find the volume of the cone.
a) V = (1/2) BH
b) V = (2/3) BH
c) V = (1/3) BH
d) V = (3/2) BH

45) Find the equation of the locus of a point which moves so that the difference of its distance from points (-4, 0) and (4, 0) is 6.
a) $9x^2 – 9y^2 = 81$
b) $7x^2 – 7y^2 = 49$
c) $9x^2 – 7y^2 = 63$
d) $7x^2 – 9y^2 = 63$

46) The altitude and radius of the cone were measured and found to be 2m and 1m respectively. If the maximum possible errors in measurement are 3cm and 2cm respectively, find the maximum possible error in calculating the volume.
a) 0.115 cu. m
b) 0.15 cu. m
c) 0.111 cu. m

d) 0.151 cu. m

47) A 6 ft. tall man walks away from a 20-ft high lamp post at a rate of 3 ft/sec. Find how fast is the tip of his shadow moving.
   a) (30/7) ft/sec
   b) 5 ft/sec
   c) 4 ft/sec
   d) 4.33 ft/sec

48) A 6 ft. tall man walks away from a 20-ft high lamp post at a rate of 3 ft/sec. How fast is the length of his shadow changing?
   a) 1 ft/sec
   b) 2 ft/sec
   c) 0.39 m/sec
   d) 1.29 m/sec

49) A < C if and only if B – A is _____
   a) Positive
   b) Negative
   c) zero
   d) none of these

50) Find the angle that the parabola $x^2 = y + 2$ makes with the x-axis
   a) $75.03°$
   b) $70.53°$
   c) $63.4°$
   d) $64.3°$

MATHEMATICS

1. A
2. B
3. C
4. D
5. C
6. B
7. A
8. B
9. C
10. D
11. A
12. A
13. B
14. B
15. C
16. C
17. D
18. D
19. A
20. C
21. D
22. B
23. C
24. A
25. B
26. A
27. D
28. B
29. B
30. B
31. C
32. C
33. D
34. B
35. A
36. B
37. D
38. B
39. A
40. B
41. C
42. D
43. D
44. C
45. D
46. A
47. A
48. C
49. A
50. B