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AGRICULTURAL AND BIOSYSTEMS ENGINEERING COMPREHENSIVE ONLINE REVIEW

ALGEBRA

1. The process of raising a number to a power is sometimes called as:
   a. involution
   b. rootfinding
   c. evolution
   d. rationalization

2. The expression
$$\frac{4^{n-2} - 4^{n+2}}{2^{n-4} - 2^{n+4}}$$
when simplified is equal to:
   a. $2^{n+1} - 1/8$
   b. -2^{n+1}
   c. $1 - 2^n$
   d. 2^n

3. Solve for x in the following equation:
$$9^{2x-1} = 3^x$$
   a. 1/2
   b. 2/3
   c. ¾
   d. 4/5

4. A number which could not be expressed as a quotient of two integers.
   a. natural
   b. irrational
   c. rational
   d. surd

5. Simplify: $\sqrt{x^{4n+1}} + x^n\sqrt{x^{2n+1}}$
   a. $x^{4n} + x^{2n}$
   b. $4x^{2n-1}$
   c. $2x^{2n}\sqrt{x}$
   d. $x^{-4n} - x^{-2n}$

6. Solve for the value of x that will satisfy the equation: $\sqrt{x+2} = -1$.
   a. -1
   b. 3
   c. 2
   d. no solution

7. Factor the following expression:
$$x^3 + 3x^2 - x - 3$$
   a. $(x-3)(x^2+1)$
   b. $(x^2+3)(x-1)$
   c. $(x^2-3)(x^2+1)$
   d. $(x+3)(x^2-1)$

8. Simplify: $\frac{x^2+3x+2}{x-2} \cdot \frac{x^2-4}{x+1}$

   a. $(x+2)^2$
   b. $(x+1)(x+3)$
   c. x^2-4
   d. x^2-2x+4

9. If $x^2 + y^2 = 29$ and $x^5y^5 = 100{,}000$, what is $(x - y)^2$?
   a. 3
   b. 6
   c. 9
   d. 12

10. This refers to the logarithm of the reciprocal of a number
    a. antilog
    b. characteristic
    c. mantissa
    d. cologarithm

11. Solve for x:
$$\ln(x-3) + \ln(x-2) = \ln(2x+24)$$
    a. -2
    b. 9
    c. -2 and 9
    d. 4 and -2

12. If x = log 2 and y = log 3, express log(1.2) in terms of x and y.
    a. 2x + y – 1
    b. x – y
    c. $x^2y/10$
    d. 6/5(x + y)

13. Solve for x: $\log_4(\log_3(\log_2 x)) = 0$.
    a. 2
    b. 4
    c. 6
    d. 8

14. This refers to the quantity that gives information about the nature of the roots, especially for quadratic equations.
    a. discriminant
    b. Wronskian
    c. kernel
    d. any of these

15. Determine the sum of the reciprocal of roots given by the quadratic equation $x^2 + 5x – 14 = 0$.
    a. ½
    b. -7
    c. 5/14
    d. 14/5

16. Find the sum of the numerical coefficient in the expansion of $(2x - 1)^{20}$.
    a. 0
    b. 2
    c. 1
    d. 3

17. Solve: $x^2 – x – 6 \leq 0$
    a. (-2, 3)
    b. (-3, 2)
    c. [-2, 3]
    d. [-3, 2]

18. What is the remainder R(x) when the polynomial $P(x) = x^3-7x-6$ is divided by D(x) = x – 4.
    a. 5
    b. 15
    c. 30
    d. 60

19. Let *f(x)* be a polynomial such that *f(c) = 0* for some constant *c*. Then *x – c* is a factor of *f(x)*. Conversely, if *x – c* is a factor of *f(x)*, then *f(c) = 0*.
    a. Zero theorem
    b. Mean Value theorem
    c. Factor theorem
    d. Remainder theorem

20. The sum of the ages of Bianca and Camille is 21. Bianca will be twice as old as Camille 3 years from now. What is the present age of Bianca?
    a. 8
    b. 6
    c. 18
    d. 15

21. The present ages of Louis and Niall are in the ratio of 1:2. Three years from now, the ages will be in the ratio 3:5. How old is Niall today?
    a. 12
    b. 10
    c. 8
    d. 6

22. It takes three hours for an inlet pipe to fill a tank and six hours for an outlet pipe to drain it. A forgetful maintenance worker empties a tank and then refills it. However, he forgot to close the outlet pipe when the refilling starts. How many hours will it take the tank to be half – filled?
    a. 1 hr
    b. 2 hrs
    c. 1.5 hrs
    d. 3 hrs

23. It takes Giga twice as long as it takes Merl to do a certain piece of work. Working together they can do the work in 6 days. How long would it take Merl to do it alone?
    a. 9
    b. 8
    c. 6
    d. 4

24. Ten liters of 25% salt solution and 15 liters of 35% salt solution are poured into a drum originally containing 30 liters of 10 % salt solution. What is the percent concentration of salt in the mixture?
    a. 19.55%
    b. 27.05%
    c. 22.15%
    d. 25.72%

25. A blue train leaves Central station traveling east at 15 miles per hour. Four hours later, a yellow train leaves Central station traveling east at 35 miles per hour. How many miles from Central station will the yellow train overtake the blue train?
    a. 105
    b. 150
    c. 510
    d. 501

26. What time after 3:00 o'clock will the minute-hand and the hour-hand of the clock be in straight line for the first time?
    a. 3:49.09 pm
    b. 3:26.19 pm
    c. 3:29.05 pm
    d. 3:31.29 pm

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