1. Find the equation in standard form of the tangent line to the circle \( x^2 + y^2 - 12x + 8y + 7 = 0 \) at the point \((3, 2)\).
   a. \( x + y = 5 \)  
   b. \( 2x - y = 4 \)  
   c. \( 3x - 2y = 0 \)  
   d. \( x - 2y = -1 \)  
   e. NOTA

2. Find the equation of the directrix of the parabola \( y^2 + 8x - 6y + 25 = 0 \).
   a. \( x = 1 \)  
   b. \( y = 1 \)  
   c. \( x = 0 \)  
   d. \( y = 5 \)  
   e. NOTA

3. Each of the statements below can be completed accurately with the word “always”, “sometimes” or “never”. How many of the statements below will be completed with the word “sometimes”?
   I. A square is ____________ a rectangle.
   II. The diagonals of a rectangle are __________congruent.
   III. The diagonals of a parallelogram ____________bisect the angles.
   IV. A trapezoid ___________has three congruent sides
   a. 0  
   b. 1  
   c.2  
   d. 3  
   e. NOTA

4. What is the constant term in the expansion of \( \left( x^2 - \frac{3}{x^3} \right)^{10} \)?
   a. -81  
   b. 81  
   c. -630  
   d. 17,010  
   e. NOTA

5. Evaluate: \( \sum_{i=21}^{200} (2i - 7) = \)
   a. 38,520  
   b. 38,306  
   c. 46,700  
   d. 19,280  
   e. NOTA

6. Simplify the expression, for \( x > 1 \):
   \( \frac{(x+3)!((8x-8)(0.5x+0.5))^{n+1}}{x!(x^2-1)(1+x)^n2^{-n}} \)
   a. 1  
   b. 4  
   c. \( \frac{1}{2}(x+3)(x+1) \)  
   d. \( 4(x + 3)(x + 1) \)  
   e. NOTA

7. What is the remainder of \( (x - i)^{2009} \) when divided by \( x \). \( (i = \sqrt{-1}) \)?
   a. -i  
   b. -1  
   c. 1  
   d. \( (xi)^{2005} \)  
   e. NOTA

8. My bank account compounds continuously. How long in years will it take my account to double if I make the first deposit at a rate of \( (100\ln 3)\% \)?
   a. \( \log 2 \)  
   b. \( \log_2 2 \)  
   c. \( 2^3 \)  
   d. \( 3^2 \)  
   e. NOTA

9. Simplify:
   \( \frac{(\log 2)(\log 3)(\log 4)\cdots(\log 2007)(\log 2008)(\log 2009)}{(\ln 3)(\ln 4)(\ln 5)\cdots(\ln 2007)(\ln 2008)(\ln 2009)} \)
   a. \( \frac{\log 2}{(\ln 10)^{2009}} \)
   b. \( \frac{\ln 2}{(\ln 10)^{2009}} \)
   c. \( \frac{\ln 2}{2008(\ln 10)} \)
   d. \( \frac{\log 2}{(\ln 10)^{2007}} \)
   e. NOTA
10. If a dart is thrown and lands inside a region defined by $y \geq 0, y \leq 4, y \leq 2x, x \leq 10$, what is the probability that the dart hits the defined region where $x \leq 2$?
   a. $\frac{1}{3}$  
   b. $\frac{11}{10}$  
   c. $\frac{1}{9}$  
   d. $\frac{2}{3}$  
   e. NOTA

11. The perimeter of a sector of a circle is 12. Find the radius of that circle so that the area of the sector is a maximum.
   a. 2  
   b. 3  
   c. 4  
   d. 6  
   e. NOTA

12. The capacity of an auditorium is 600. For a performance, with the auditorium not filled to capacity, the receipts were $330.00. Admission prices were $0.75 for adults and $0.25 for kids. If $a$ represents the number of adults at the performance, find the minimum value of $a$.
   a. 360  
   b. 361  
   c. 362  
   d. 363  
   e. NOTA

13. An airplane flies round trip a distance of $L$ miles each way. The velocity against a head wind is 160 mph, while the velocity with a tail wind is 240 mph. What is the average speed for the round trip?
   a. 190 mph  
   b. 192 mph  
   c. 196 mph  
   d. 200 mph  
   e. NOTA

14. For the equation $kx^2 + 5x = 10k$, one root is -5. Find the other root.
   a. Cannot be determined  
   b. 1  
   c. 2  
   d. 5  
   e. NOTA

15. Let $f$ be the function defined by $f(x) = 1 + \frac{1}{2 - \frac{1}{3 + \frac{1}{4 - \frac{1}{x}}}}$. Find the zero of $f$.
   a. $\frac{5}{22}$  
   b. $\frac{3}{13}$  
   c. $\frac{1}{4}$  
   d. $\frac{9}{35}$  
   e. NOTA

16. X, Y and Z are collinear points such that Y is between X and Z. If $XY = \frac{5}{8}XZ$ and $XY = 15$. What is the value of $YZ$?
   a. 6  
   b. 9  
   c. 12  
   d. 24  
   e. NOTA

17. The supplement of an angle is 60 degrees less than twice the supplement of the complement of the angle. What is the degree measure of the complement of the angle?
   a. 20  
   b. 60  
   c. 70  
   d. 160  
   e. N/OTA

18. Each interior angle of a regular polygon exceeds each exterior angle by 150 degrees. Find the number of diagonals in the polygon.
   a. 9  
   b. 24  
   c. 27  
   d. 135  
   e. NOTA

19. In triangle XYZ, the measure of angle X is four times as large as the measure of angle Y. If the measure of the exterior angle at Z is 130 degrees, what is the number of degrees in the measure of angle X?
   a. 10  
   b. 26  
   c. 40  
   d. 104  
   e. NOTA
20. Given isosceles triangle DEC with congruent sides DE and DC: If DE is extended through point E to point B, and if CE is extended through point E to point A, another isosceles triangle ABE is formed with congruent sides AB and BE. If the measure of angle A is $5x - 7$ and the measure of angle D is $4x + 12$, find the value of x.

a. 13  
   b. 19  
   c. $\frac{163}{13}$  
   d. $\frac{85}{9}$  
   e. NOTA

21. Solve for the positive value of $b$ such that the following equation has a double root.

$6x^2 - 2bx + \frac{3}{4} = 0$.

a. $\frac{3}{2}$  
   b. $\frac{3\sqrt{2}}{2}$  
   c. 3  
   d. $3\sqrt{2}$  
   e. NOTA

22. What is the area enclosed by a rhombus with sides of length 29 and main diagonal of length 42?

a. 609  
   b. 840  
   c. 882  
   d. 1160  
   e. NOTA

23. What is the area enclosed by the ellipse $16x^2 - 64x + 9y^2 + 54y = -73$?

a. $3\sqrt{2}\pi$  
   b. $6\pi$  
   c. $6\sqrt{3}\pi$  
   d. $12\pi$  
   e. NOTA

24. What is the sum of real roots in the equation $2x^3 - 2x^2 + 18x - 18 = 0$?

a. -1  
   b. 0  
   c. 1  
   d. 4  
   e. NOTA

25. What is the value of $\sum_{k=5}^{12} k^3$?

a. 16,471  
   b. 17,200  
   c. 21,384  
   d. 22,113  
   e. NOTA

26. Which lines or segments of a triangle are concurrent in a point equally distant from the vertices of the triangle?

a. Angle Bisectors  
   b. Altitudes  
   c. Medians  
   d. Perpendicular bisectors of the sides  
   e. NOTA

27. Given parallelogram ZIWE with the measure of angle I = $4x + 15$ and the measure of angle E = $6x - 2$, then find the measure of angle W.

a. 51  
   b. 81  
   c. 121  
   d. 131  
   e. NOTA

28. If a diagonal of a quadrilateral divides the quadrilateral into two congruent triangles, then which of the following must be true about the quadrilateral?

a. It is a square  
   b. It is a rectangle  
   c. It is a rhombus  
   d. It is a parallelogram  
   e. NOTA

29. The measure of an obtuse angle of a parallelogram is 30 degrees more than twice the measure of the next consecutive angle of the parallelogram. Find the degree measure of the smaller angle.

a. 50  
   b. 59  
   c. 61  
   d. 80  
   e. NOTA

30. The altitude to the hypotenuse of an isosceles right triangle has length 8. What is the length of the hypotenuse of the original triangle?

a. More information needed  
   b. 8  
   c. $8\sqrt{2}$  
   d. 16  
   e. NOTA