1. For $x^2 - 5x + 6 = 0$, what is the sum of the roots $\alpha + \beta = -b/a$?

   _____

2. For a reduced rational function with a non-zero remainder, a sloping straight-line asymptote occurs when the numerator degree is:

   ☐ exactly one more than the denominator degree

   ☐ one less than the denominator degree

   ☐ two more than the denominator degree

   ☐ equal to the denominator degree

3. Using $\Sigma r = \frac{1}{2}n(n+1)$, what is the sum of the first 5 integers?

   _____

4. What is the determinant of the matrix [[3, 1], [2, 4]] (ad − bc)?

   _____

5. In polar coordinates, the x-coordinate is given by:

   ☐ $r \sin \theta$

   ☐ $r \tan \theta$

   ☐ $r \cos \theta$

   ☐ r / θ

6. For two non-parallel non-zero vectors a and b, their vector product $a \times b$ is:

   ☐ equal to the vector a + b

   ☐ a scalar, not a vector

   ☐ perpendicular to both a and b

   ☐ parallel to a and to b

7. The two steps of proof by induction are the base case and the:

   ☐ inductive step

   ☐ substitution step

   ☐ differentiation step

   ☐ final check at n = 100

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9. You find an oblique asymptote by:

   ☐ differentiating the rational function

   ☐ taking the modulus of the function

   ☐ setting x = 0 in the function

   ☐ dividing the top polynomial by the bottom

10. Using $\Sigma r^2 = (1/6)n(n+1)(2n+1)$, what is the sum of the first 3 squares?

    _____

1. **5**

   $\alpha + \beta = -b/a = -(-5)/1 = 5$.

2. **exactly one more than the denominator degree**

   When the numerator's degree exceeds the denominator's, dividing out leaves a slant line the curve approaches.

3. **15**

   $\tfrac{1}{2} \times 5 \times 6 = 15$ (= 1+2+3+4+5).

4. **10**

   det = $3{\times}4 - 1{\times}2 = 12 - 2 = 10$.

5. **r cos θ**

   $x = r \cos\theta$ and $y = r \sin\theta$.

6. **perpendicular to both a and b**

   $a \times b$ is perpendicular to both vectors; its length is $|a||b|\sin\theta$.

7. **inductive step**

   Induction needs a base case plus an inductive step from k to k+1.

8. **6**

   $\alpha\beta = c/a = 6/1 = 6$.

9. **dividing the top polynomial by the bottom**

   Polynomial division gives the straight-line part the curve approaches far from the origin.

10. **14**

    $(1/6)(3)(4)(7) = 84/6 = 14$ (= 1+4+9).

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