0. What is the secant of the smaller angle between the vectors $[3, 4]$ and $[12, -5]$?

1. How many times do the graphs of $y = 1000(x-1)(x-2)(x-3)$ and $y = \ln(x)$ intersect?

2. Evaluate: $\dfrac{\left(\sin 225°\right)\left(\tan 300°\right)}{\cos 150°}$

3. What is the sum of the infinite geometric series whose first term is 2520 and whose second term is 1680?

4. What is the smallest natural number with exactly nine positive integral factors?

5. The probability of event A occurring, given that event B occurs, is $\dfrac{2}{3}$. The probability of event B occurring, given that event A does not occur, is $\dfrac{3}{4}$. If the probability that neither event occurs is $\dfrac{1}{10}$, what is the probability of both events occurring?

6. What is the sum of the reciprocals of the complex roots of $3x^3 - 22x^2 + 13x - 42 = 0$?

7. Solve for x: $\log_8\left(\log_{81}\left(\log_6 x\right)\right) = -\dfrac{2}{3}$

8. A triangle with a perimeter of twelve centimeters has an inscribed circle with an area of π square centimeters. What is the area of the triangle, in square centimeters?

9. What is the sum of the positive integral factors of 144?

10. What is the area of a triangle whose sides have lengths of $\sqrt{13}$, $\sqrt{17}$, and $2\sqrt{10}$?

11. What is the sum of the cubes of the twenty smallest natural numbers?

12. In how many ways can five boys (Bob, Bill, Butch, Bernard, and Beau) and three girls (Gail, Glenda, and Gertrude) sit next to one another in a row of eight seats if no two girls may sit together?

13. Evaluate: $\sin^2 10° + \sin^2 40° + \sin^2 50° + \sin^2 80°$

14. Determine the sum of all values of x between 0 and 2π inclusive for which $\sin(2x) = \dfrac{1}{2}$.

15. Evaluate: $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n^2 + n - 2}$

16. Chords $\overline{AB}$ and $\overline{CD}$ of lengths 10 and 12, respectively, intersect at point E in circle O, intersecting in such a way that at least one of the segments produced ($\overline{AE}$, $\overline{BE}$, $\overline{CE}$, and $\overline{DE}$) has a length of 4. Determine all possible lengths of $\overline{AE}$.

17. Determine the equation of the parabola with vertex $(5, 3)$ which passes through the point $(1, 2)$ and whose axis of symmetry is parallel to the x-axis.