Find the sum of the integer values of \( x \) for which \( 4x^4 + 16x^3 - 7x^2 - 28x = 0 \).
If \( \sin \frac{p}{9} \) and \( \cos \frac{p}{9} \) are the roots of \( x^2 - bx + c = 0 \), find \( b \) in terms of \( c \).
The domain of \( y = \log_3 \left( \frac{x^2}{x} \right) \) can be written in the form \((A, B) \quad (C, D) \quad (E, \ )\). Find the value of \( A + B + C + D + E \), written as an improper fraction.
Find the sum of the elements in the third column of \( A^{-1} \) if
\[
A = \begin{pmatrix}
5 & 3 & 2 \\
2 & 4 & 3 \\
4 & 2 & 5
\end{pmatrix}
\]
Write your answer as a fraction.
Find the smallest root of $250x^3 - 1075x^2 + 645x - 54 = 0$, given that its roots are in geometric progression.
A biologist is studying patterns of male (M) and female (F) children in families. A family type is designated by a code. For example, FMM denotes a family of three children of which the oldest is a female and the other two are males. (Note that FMM, MFM, and MMF are different types.) How many family types are there among families with at least one but not more than seven children?
Find the sum of the $x$- and $y$-values of all pairs of positive integer solutions to $4x + 7y = 97$. 
Simplify, where $i = \sqrt{-1}$:

\[
(1+i)^2 + (1+i)^3 + (1+i)^4 + (1+i)^5 + \\
(1 \cdot i)^2 + (1 \cdot i)^3 + (1 \cdot i)^4 + (1 \cdot i)^5.
\]
Evaluate: \( \sum_{n=1}^{\infty} \frac{4}{n^2 + 4n + 3} \). Write your answer as an improper fraction.
How many integers between 1 and 6300 inclusive are divisible by none of 3, 5, and 7?
Seven friends are sitting in a theater on a row with only seven seats. After intermission, they return to the same row but choose their seats randomly. What is the probability that neither of the people sitting in the two aisle seats was previously sitting in the aisle seat? Express your answer as a fraction.
When the solutions to $x^3 - 64 = 0$ are graphed and connected on the complex (Argand) plane, a triangle is formed. Find the area enclosed by this triangle.
For what real number \( f \) does \( x^2 + 8x + 12 = f \) have exactly three solutions?

For what real number \( f \) does \( x^2 + 8x + 12 = f \) have exactly three solutions?
Find the remainder when $43^{13}$ is divided by 13.
Find $\left( A^T \right)^{-1}$ if $A = \begin{bmatrix} 1 & 5 & 3 \\ 2 & 4 & 7 \\ 4 & 6 & 2 \end{bmatrix}$.