

2004 Mu Alpha Theta Convention  
Hustle: Algebra II

- Find matrix  $AB$  if  $A = \begin{bmatrix} 2 & 5 \\ 1 & -3 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & -2 \\ 8 & 1 \end{bmatrix}$ .
- Simplify  $\log_2 4 + \log_3 9 + \log_4 16 + \dots + \log_{100} 100$ .
- If one solution of  $2x^3 + 5x^2 - 28x - 15 = 0$  is  $x = -1/2$ , find the sum of the remaining two solutions.
- Which of the following equations does NOT describe a conic section?  
A)  $x^2 - y^2 = 4$                       B)  $x^2 + y^2 = 4$   
C)  $y^2 = x + 4$                          D)  $y^2 = 3$
- Find the third quadrant point of intersection of the graphs of  $x^2 - y^2 = 16$  and  $x^2 + y^2 = 34$ .
- If  $[x]$  denotes the greatest integer function, find all values of  $x$  for which  $[2x + 1] = -1$ . Give your answer in interval notation.
- Find the 150<sup>th</sup> term of the arithmetic sequence 8, 5, 2, -1, . . . .
- Find  $k$  so that the roots of the equation  $5x^2 + x + 1 = k$  are equal.
- Find  $k$  if the graph of  $y = 2x^2 + 2kx - k$  contains the point (2, 3).
- Solve for  $x$  if  $x^2\sqrt{2} - 3x - \sqrt{8} = 0$ .
- Find all  $x$  so that  $\begin{vmatrix} x^2 & 4 & 9 \\ x & 2 & 3 \\ 1 & 1 & 1 \end{vmatrix} = 0$ .
- Solve for  $x$  if  $9^x - 10 \cdot 3^x + 9 = 0$ .
- Simplify  $(6 - 3i)(4 + 3i)$ .
- Find  $x$  so that  $\sqrt[3]{2x^2 + 15x} = 2$ .
- Find the remainder when  $2x^3 - 5x^2 + 6x - 5$  is divided by  $2x - 1$ .
- If  $(a, b)$  is the center of the graph of  $4x^2 - 3y^2 - 8x + 18y = 35$ , find  $ab$ .
- Find all  $x$  so that  $9^{x-2} = 27^x$ .
- If  $f(x) = \frac{x+1}{2}$ , find  $f^{-1}(4)$ .
- Solve for  $x$  if  $\log_5(2x + 1) - \log_5 x = 2$ .
- Find  $k$  if  $1 + 3 \ln 2 = \ln k$ .
- Evaluate, if possible,  $96 + 24 + 6 + 3/2 + \dots$
- If two numbers differ by 7, what is their least possible product?
- Find  $g(3)$  if  $g$  is a linear function so that  $g(1) = -2$  and  $g(4) = 8$ .
- Solve for  $x$  if  $\sqrt{11-x} = \sqrt{-5x} + 1$ .
- Find the simplest form of the fractional equivalent of  $0.07\overline{12}$ .