1. (20 Points) Given the following system to two linear equations in two unknowns:

\[
\begin{align*}
  x + y &= 3 \\
  2x - y &= 0
\end{align*}
\]

a. (5 Points) Solve the system graphically.

\[
\begin{array}{c}
\text{Graphical Solution:}
\end{array}
\]

\[
\begin{array}{c}
\text{Intersection at (1, 2)}
\end{array}
\]

b. (5 Points) Check that your solution satisfies the two equations.

**Solution:**
letting \( x = 1 \) and \( y = 2 \) we have: \((1) + (2) = 3 \) and \( 2 \cdot (1) - (2) = 0 \).

c. (5 Points) Solve the system by either the substitution method or the elimination method.

**Substitution:**
The second equation is \( y = 2x \). Substituting this into the first gives \( x + 2x = 3 \Rightarrow 3x = 3 \Rightarrow x = 1 \). Substituting this back into the second gives \( y = 2 \).

**Elimination:**
add both equations \( x + y = 3 \)
multiply first by -2 then add \( -2x - 2y = -6 \)

\[
\begin{align*}
  x + y &= 3 \\
  2x - y &= 0 \\
  3x + 0y &= 3
\end{align*}
\]

\[
\begin{align*}
  + & 2x - y = 0 \\
  + & 2x - y = 0 \\
  \hline
  3x + 0y &= 3
\end{align*}
\]

\[
\begin{array}{c}
\text{divide by 3:} \\
\text{x = 1}
\end{array}
\]

\[
\begin{array}{c}
\text{divide by -3:} \\
\text{y = 2}
\end{array}
\]

d. (5 Points) Write the augmented coefficient matrix corresponding to this system.

**Solution:**
\[
\begin{pmatrix}
  1 & 1 & | & 3 \\
  2 & -1 & | & 0
\end{pmatrix}
\]