Math 307 Homework
August 26, 2015

1. Suppose that $f(x) = ax^2 + bx + c$ is a quadratic polynomial whose graph passes through the points $(-1, 1)$, $(0, 0)$, and $(1, 2)$. Use this information to write down a linear system satisfied by (a, b, c), and find a solution for it.

   Hint: Make sure you notice that a, b, and c will actually be the *variables* in your linear system!

2. Show that $\left(\dfrac{de - bf}{ad - bc}, \dfrac{af - ec}{ad - bc}\right)$ is a solution of the 2×2 linear system

$$\begin{aligned} ax + by &= e, \\ cx + dy &= f, \end{aligned}$$

   as long as $ad \neq bc$.

3. Identify which row operations are being performed in each step below. (Not just the general type, but which multiple of which row is added to which other row, etc.) Make sure you notice this continues onto the second page!

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & -5 & 6 \\ 7 & 9 & 8 \\ 6 & 7 & 5 \end{bmatrix} \xrightarrow{(a)} \begin{bmatrix} 1 & 2 & 3 \\ 4 & -5 & 6 \\ 6 & 7 & 5 \\ 7 & 9 & 8 \end{bmatrix}$$

$$\xrightarrow{(b)} \begin{bmatrix} 1 & 2 & 3 \\ 0 & -13 & -6 \\ 6 & 7 & 5 \\ 7 & 9 & 8 \end{bmatrix}$$

$$\xrightarrow{(c)} \begin{bmatrix} 1 & 2 & 3 \\ 0 & 13 & 6 \\ 6 & 7 & 5 \\ 7 & 9 & 8 \end{bmatrix}$$

$$\xrightarrow{(d)} \begin{bmatrix} 1 & -11 & -3 \\ 0 & 13 & 6 \\ 6 & 7 & 5 \\ 7 & 9 & 8 \end{bmatrix}$$

$$\xrightarrow{(e)} \begin{bmatrix} 1 & -11 & -3 \\ 0 & 13 & 6 \\ 7 & -4 & 2 \\ 7 & 9 & 8 \end{bmatrix}$$

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\xrightarrow{(f)} \begin{bmatrix} 1 & -11 & -3 \\ 0 & 13 & 6 \\ 7 & -4 & 2 \\ 0 & 13 & 6 \end{bmatrix}
\xrightarrow{(g)} \begin{bmatrix} 1 & -11 & -3 \\ 0 & 0 & 0 \\ 7 & -4 & 2 \\ 0 & 13 & 6 \end{bmatrix}
\xrightarrow{(h)} \begin{bmatrix} 1 & -11 & -3 \\ 0 & 13 & 6 \\ 7 & -4 & 2 \\ 0 & 0 & 0 \end{bmatrix}.
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