MATH 210, DISCUSSION 326 QUIZ 7 APRIL 9, 2008

NAME:

Problem 1 (7.5 points):
A band has two goods: funk and noise. The production of one unit of funk requires .2 units of funk and .6 units of noise. The production of one unit of noise requires .4 units of funk and .4 units of noise. Find the production schedule that meets the exteral demand for 12 units of funk and 18 units of noise.

Solution:
We know $\mathbf{A} = \begin{bmatrix} .2 & .4 \\ .6 & .4 \end{bmatrix}$ and $\mathbf{D} = \begin{bmatrix} 12 \\ 18 \end{bmatrix}$, so we must solve $\mathbf{AX} + \mathbf{D} = \mathbf{X}$ for $\mathbf{X}$. Thus:

$$
\begin{aligned}
\mathbf{D} = \begin{bmatrix} 12 \\ 18 \end{bmatrix} &= \mathbf{X} - \mathbf{AX} \\
&= (\mathbf{I} - \mathbf{A})\mathbf{X} \\
&= \left(\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} .2 & .4 \\ .6 & .4 \end{bmatrix} \right)\mathbf{X} \\
&= \begin{bmatrix} .8 & -.4 \\ -.6 & .6 \end{bmatrix}\mathbf{X}
\end{aligned}
$$

Now we can row reduce to obtain $\mathbf{X} = \begin{bmatrix} 60 \\ 90 \end{bmatrix}$.

Problem 2 (7.5 points):
Graph and shade the set of points which satisfy the following system of inequalities (feel free to use the back of the paper).

$$
\begin{aligned}
y &\geq 0 \\
y &\leq 3x \\
y &\leq -2x + 10
\end{aligned}
$$

Label the corner points of the region you obtain.

Solution:
The region is a triangle with corners $(0, 0), (2, 6), (5, 0)$.