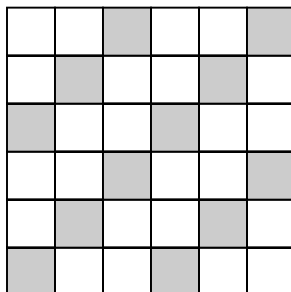


Mathematics 308—Fall 1996

Mathematics 308 mid-term examination

Write a PostScript program to draw the following figure:



```
%!

72 dup scale
2.5 0 translate
0.010 setlinewidth

% s

/square {
/s exch def
  0 0 moveto
  s 0 lineto
  s s lineto
  0 s lineto
  closepath
} def

/s 0.25 def

0 1 5 {
/i exch def
0 1 5 {
/j exch def

gsave
  i s mul j s mul translate
i 3 mod j 3 mod eq
{
  gsave
  0.8 setgray
  newpath
  s square
  fill
  grestore
}
if
```

```
newpath  
s square  
stroke  
grestore
```

```
} for  
} for
```

(a) Write down a parametrization for the ellipse

$$4x^2 + 9y^2 = 1 .$$

Be careful!

(b) On the next page, write down a complete PostScript program which uses this parametrization and `mkpath` to draw this curve. Make your program a bit flexible.

(a) Draw the line $2x + y = 1$ below. Show the reflection of the origin through this line. Show the reflection of $(2, 1)$ through this line.

(b) Write down a formula for the reflection of (x, y) through this line.

(c) Write down a formula for the reflection of (x, y) in the line $Ax + By = 0$.