ECON 331

HOMEWORK ASSIGNMENT #1

QUESTION 1

a)

```
> Diff( 20-2*p1+p2, p2);
> value(%);
```

$$\frac{\partial}{\partial p2}(20 - 2\,p1 + p2)$$

$$1$$

```
> Diff( 25+p1-3*p2, p1);
> value(%);
```

$$\frac{\partial}{\partial p1}(25 + p1 - 3\,p2)$$

$$1$$

b)

```
> d1 := q1=20-2*p1+p2;
> d2 := q2=25+p1-3*p2;
> s1 := q1=2*p1;
> s2 := q2=2*p2;
```

$$d1 := q1 = 20 - 2\,p1 + p2$$

$$d2 := q2 = 25 + p1 - 3\,p2$$

$$s1 := q1 = 2\,p1$$

$$s2 := q2 = 2\,p2$$

```
> solve( {d1, d2}, {p1, p2});
```

$$\left\{ p1 = -\frac{1}{5}\,q2 + 17 - \frac{3}{5}\,q1, p2 = -\frac{1}{5}\,q1 + 14 - \frac{2}{5}\,q2 \right\}$$

c)

```
> solve( {d1, d2, s1, s2}, {q1, q2, p1, p2});
```

$$\left\{ p1 = \frac{125}{19}, p2 = \frac{120}{19}, q2 = \frac{240}{19}, q1 = \frac{250}{19} \right\}$$

QUESTION 2

```
> with(linalg):

> A := matrix( 2, 2, [1, 1, 2, 3]);
> c := vector( [4, 2]);
> d := vector( [1, 2]);
> A_inv := inverse(A);
```

$$A := \begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix}$$

$$c := [4, 2]$$

$$d := [1, 2]$$

$$A\_inv := \begin{bmatrix} 3 & -1 \\ -2 & 1 \end{bmatrix}$$

```
> x := evalm( A_inv &* d -c);
```

$$x := [-3, -2]$$

QUESTION 3

a)

The goods market equilibrium condition is represented by equation g1, while the money market equilibrium condition is represented by equation m1:

```
> restart;
> g1:= Y = Co + b*(Y - t*Y) + Io - a*r + G;
> m1:= Mo = k*Y - B*r;
```

$$g1 := Y = Co + b\,(Y - t\,Y) + Io - a\,r + G$$

$$m1 := Mo = k\,Y - B\,r$$

The IS locus (Y as a function of r) is:

```
> solve( {g1}, {Y});
```

$$\left\{ Y = \frac{-a\,r + Co + Io + G}{-b + b\,t + 1} \right\}$$

The LM locus (Y as a function of r) is:

```
> solve( {m1}, {Y});
```

$$\left\{ Y = \frac{Mo + B\,r}{k} \right\}$$

b)

To graph the LS and LM loci in (Y,r) space we need to invert the equations we solved for above. This is easily done as follows:

```
> solve( {g1}, {r});
```

$$\left\{ r = -\frac{Y - Co - b\,Y + b\,t\,Y - Io - G}{a} \right\}$$

```
> solve( {m1}, {r});
```

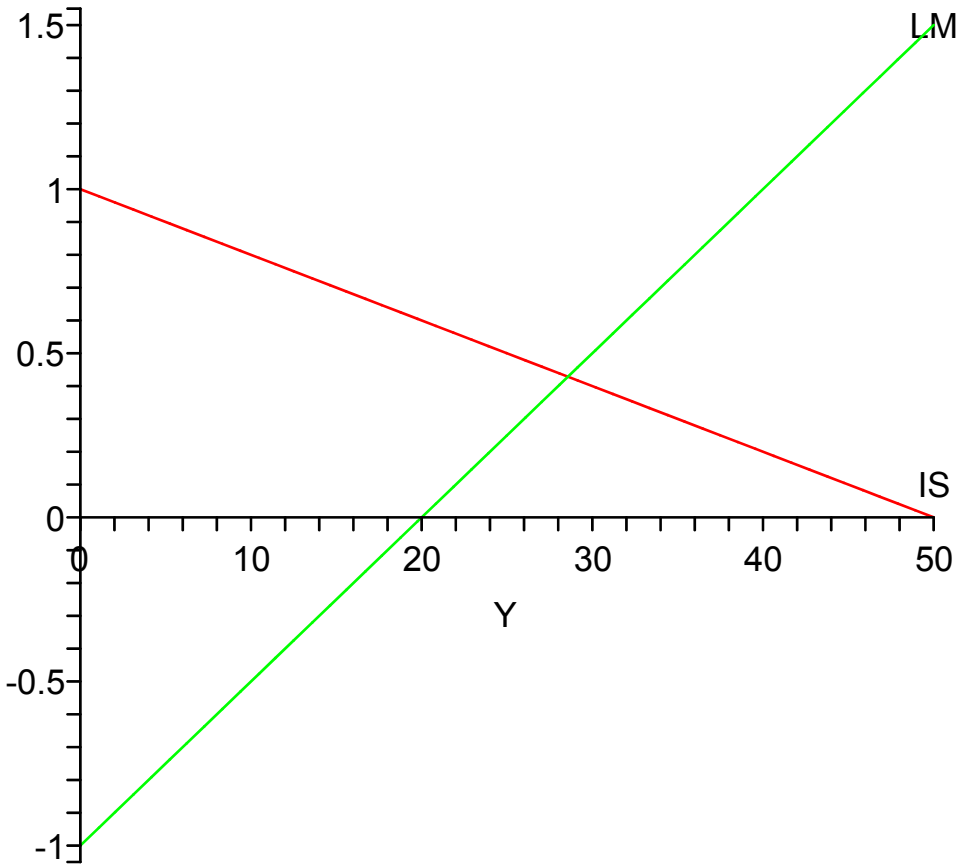
$$\left\{ r = -\frac{Mo - k\,Y}{B} \right\}$$

To graph the loci in Maple we need to assign some values to the parameters in our model:

```
> Co:=10:
> Io:=10:
> G:=10:
> b:=0.8:
> t:=0.5:
> a:=30:
> Mo:=10:
> k:=0.5:
> B:=10:
```

The loci can now be plotted in the following manner:

```
> with(plots):
> Z:=plot( [-(Y-Co-b*Y+b*t*Y-Io-G)/a, (-Mo+k*Y)/B], Y=0..50):
> U:=textplot( [50, 1.5, 'LM']):
> V:=textplot( [50, 0.1, 'IS']):
> display( [Z, U, V]);
Warning, the name changecoords has been redefined
```



c)

```
> restart;
```

```
> with(linalg):
```

The coefficient matrix is:

```
Warning, the protected names norm and trace have been redefined and unprotected
```

```
> A:=matrix(2, 2, [1-b+bt, a, k, -B]);
```

$$A := \begin{bmatrix} 1 - b + bt & a \\ k & -B \end{bmatrix}$$

The column vector of endogenous variables is:

```
> x:=vector([Y, r]);
```

$$x := [Y, r]$$

The column vector of constants is:

```
> d:=vector([Co+Io+G, M0]);
```

$$d := [Co + Io + G, M0]$$