a L k=0,4 m,n

$q_i = 10 - 2p_1 + 0,3p_2 + 0,3p_3 + 0,3p_4 + 0,3p_5 + 0,3p_6$

```
a = 10; c = 1; l = -2; k = .4; m = .3; n = .3;

B = {{l, k, m}, {k, l, n}, {m, n, l}};
B // MatrixForm
```

$$\begin{pmatrix} -2 & 0.4 & 0.3 \\ 0.4 & -2 & 0.3 \\ 0.3 & 0.3 & -2 \end{pmatrix}$$

Ownership matrices

```
OC = {{1, 0, 0}, {0, 1, 0}, {0, 0, 1}};
OM = {{1, 1, 1}, {1, 1, 1}, {1, 1, 1}};
O12 = {{1, 1, 0}, {1, 1, 0}, {0, 0, 1}};
O13 = {{1, 0, 1}, {0, 1, 0}, {1, 0, 1}};
O23 = {{1, 0, 0}, {0, 1, 1}, {0, 1, 1}};

p = {p1, p2, p3};
q = a + p.B;
pi = (p - c) q;
FOCC = (p - c) . (B * OC) + q ;
FOCM = (p - c) . (B * OM) + q ;
FOC12 = (p - c) . (B * O12) + q ;
FOC13 = (p - c) . (B * O13) + q ;
FOC23 = (p - c) . (B * O23) + q;
pstC = p /. Solve[{FOCC[[1]] == 0, FOCC[[2]] == 0, FOCC[[3]] == 0}, {p1, p2, p3}];
pstM = p /. Solve[{FOCM[[1]] == 0, FOCM[[2]] == 0, FOCM[[3]] == 0}, {p1, p2, p3}];
pst12 = p /. Solve[{FOC12[[1]] == 0, FOC12[[2]] == 0, FOC12[[3]] == 0}, {p1, p2, p3}];
pst13 = p /. Solve[{FOC13[[1]] == 0, FOC13[[2]] == 0, FOC13[[3]] == 0}, {p1, p2, p3}];
pst23 = p /. Solve[{FOC23[[1]] == 0, FOC23[[2]] == 0, FOC23[[3]] == 0}, {p1, p2, p3}];
qstC = a + pstC.B;
qstM = a + pstM.B;
qst12 = a + pst12.B;
qst13 = a + pst13.B;
qst23 = a + pst23.B;
pistC = (pstC - c) qstC;
pistM = (pstM - c) qstM;
pist12 = (pst12 - c) qst12;
pist13 = (pst13 - c) qst13;
pist23 = (pst23 - c) qst23;
```

← Tangent function $q = a + Lp_1 + \dots$

← Profit

First Order Conditions for Different Ownerships

← Solve System

```
{pstC, pstM, pst12, pst13, pst23}
```

```
{{{3.62869, 3.62869, 3.5443}},
 {{4.30795, 4.30795, 4.14238}}, {{3.96197, 3.96197, 3.59429}},
 {{3.85878, 3.6693, 3.77902}}, {{3.6693, 3.85878, 3.77902}}}
```

```
{qstC, qstM, qst12, qst13, qst23}
```

```
{{{5.25738, 5.25738, 5.08861}}, {{4.35, 4.35, 4.3}}, {{4.73914, 4.73914, 5.18859}},
 {{4.88386, 5.33861, 4.7004}}, {{5.33861, 4.88386, 4.7004}}}
```

```
{pistC, pistM, pist12, pist13, pist23}
```

```
{{{13.82, 13.82, 12.947}}, {{14.3896, 14.3896, 13.5123}}, {{14.0372, 14.0372, 13.4607}},
 {{13.9619, 14.2504, 13.0625}}, {{14.2504, 13.9619, 13.0625}}}
```