

Problem – B (Assembly) → DATA

Test Instance-1: TAS1C1D1 (Test Assembly Setup-Profile_1 Capacity-Profile_1 Demand-Series_1)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 1
primary_demand = [[101.0000,100.0100,100.0001,100.0000]];
secondary_demand = [
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000]];

// Setup Profile - I
setup_time = [10,10,15,15,10,10,5,5,5,5];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,377.7778,711.1111];
```

Test Instance-2: TAS1C1D2 (Test Assembly Setup-Profile_1 Capacity-Profile_1 Demand-Series_2)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 2
primary_demand = [[116.0000,100.1600,100.0016,100.0000]];
secondary_demand = [
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,377.7778,711.1111];
```

Test Instance-3: TAS1C1D3 (Test Assembly Setup-Profile_1 Capacity-Profile_1 Demand-Series_3)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 3
primary_demand = [[149.0000,100.4900,100.0049,100.0000]];
secondary_demand = [
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,377.7778,711.1111];
```

Test Instance-4: TAS1C1D4 (Test Assembly Setup-Profile_1 Capacity-Profile_1 Demand-Series_4)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 4
primary_demand = [[102.2500,100.0506,100.0011,100.0000]];
secondary_demand = [
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,377.7778,711.1111];
```

Test Instance-5: TAS1C1D5 (Test Assembly Setup-Profile_1 Capacity-Profile_1 Demand-Series_5)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 5
primary_demand = [[136.0000,100.8100,100.0182,100.0004]];
secondary_demand = [
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,377.7778,711.1111];
```

Test Instance-6: TAS1C1D6 (Test Assembly Setup-Profile_1 Capacity-Profile_1 Demand-Series_6)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 6
primary_demand = [[210.2500,102.4806,100.0558,100.0013]];
secondary_demand = [
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,377.7778,711.1111];
```

Test Instance-7: TAS1C1D7 (Test Assembly Setup-Profile_1 Capacity-Profile_1 Demand-Series_7)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 7
primary_demand = [[104.0000,100.1600,100.0064,100.0003]];
secondary_demand = [
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,377.7778,711.1111];
```

Test Instance-8: TAS1C1D8 (Test Assembly Setup-Profile_1 Capacity-Profile_1 Demand-Series_8)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 8
primary_demand = [[164.0000,102.5600,100.1024,100.0041]];
secondary_demand = [
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,377.7778,711.1111];
```


Test Instance-9: TAS1C1D9 (Test Assembly Setup-Profile_1 Capacity-Profile_1 Demand-Series_9)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 9
primary_demand = [[296.0000,107.8400,100.3136,100.0125]];
secondary_demand = [
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,377.7778,711.1111];
```

Test Instance-10: TAS1C2D1 (Test Assembly Setup-Profile_1 Capacity-Profile_2 Demand-Series_1)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 1
primary_demand = [[101.0000,100.0100,100.0001,100.0000]];
secondary_demand = [
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,485.7143,914.2857];
```

Test Instance-11: TAS1C2D2 (Test Assembly Setup-Profile_1 Capacity-Profile_2 Demand-Series_2)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 2
primary_demand = [[116.0000,100.1600,100.0016,100.0000]];
secondary_demand = [
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,485.7143,914.2857];
```

Test Instance-12: TAS1C2D3 (Test Assembly Setup-Profile_1 Capacity-Profile_2 Demand-Series_3)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 3
primary_demand = [[149.0000,100.4900,100.0049,100.0000]];
secondary_demand = [
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,485.7143,914.2857];
```

Test Instance-13: TAS1C2D4 (Test Assembly Setup-Profile_1 Capacity-Profile_2 Demand-Series_4)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 4
primary_demand = [[102.2500,100.0506,100.0011,100.0000]];
secondary_demand = [
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,485.7143,914.2857];
```

Test Instance-14: TAS1C2D5 (Test Assembly Setup-Profile_1 Capacity-Profile_2 Demand-Series_5)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 5
primary_demand = [[136.0000,100.8100,100.0182,100.0004]];
secondary_demand = [
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,485.7143,914.2857];
```

Test Instance-15: TAS1C2D6 (Test Assembly Setup-Profile_1 Capacity-Profile_2 Demand-Series_6)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 6
primary_demand = [[210.2500,102.4806,100.0558,100.0013]];
secondary_demand = [
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,485.7143,914.2857];
```

Test Instance-16: TAS1C2D7 (Test Assembly Setup-Profile_1 Capacity-Profile_2 Demand-Series_7)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 7
primary_demand = [[104.0000,100.1600,100.0064,100.0003]];
secondary_demand = [
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,485.7143,914.2857];
```


Test Instance-17: TAS1C2D8 (Test Assembly Setup-Profile_1 Capacity-Profile_2 Demand-Series_8)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 8
primary_demand = [[164.0000,102.5600,100.1024,100.0041]];
secondary_demand = [
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,485.7143,914.2857];
```

Test Instance-18: TAS1C2D9 (Test Assembly Setup-Profile_1 Capacity-Profile_2 Demand-Series_9)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 9
primary_demand = [[296.0000,107.8400,100.3136,100.0125]];
secondary_demand = [
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,485.7143,914.2857];
```

Test Instance-19: TAS1C3D1 (Test Assembly Setup-Profile_1 Capacity-Profile_3 Demand-Series_1)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 1
primary_demand = [[101.0000,100.0100,100.0001,100.0000]];
secondary_demand = [
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,680.0000,1280.0000];
```

Test Instance-20: TAS1C3D2 (Test Assembly Setup-Profile_1 Capacity-Profile_3 Demand-Series_2)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 2
primary_demand = [[116.0000,100.1600,100.0016,100.0000]];
secondary_demand = [
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,680.0000,1280.0000];
```

Test Instance-21: TAS1C3D3 (Test Assembly Setup-Profile_1 Capacity-Profile_3 Demand-Series_3)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 3
primary_demand = [[149.0000,100.4900,100.0049,100.0000]];
secondary_demand = [
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,680.0000,1280.0000];
```

Test Instance-22: TAS1C3D4 (Test Assembly Setup-Profile_1 Capacity-Profile_3 Demand-Series_4)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 4
primary_demand = [[102.2500,100.0506,100.0011,100.0000]];
secondary_demand = [
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,680.0000,1280.0000];
```

Test Instance-23: TAS1C3D5 (Test Assembly Setup-Profile_1 Capacity-Profile_3 Demand-Series_5)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 5
primary_demand = [[136.0000,100.8100,100.0182,100.0004]];
secondary_demand = [
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,680.0000,1280.0000];
```

Test Instance-24: TAS1C3D6 (Test Assembly Setup-Profile_1 Capacity-Profile_3 Demand-Series_6)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 6
primary_demand = [[210.2500,102.4806,100.0558,100.0013]];
secondary_demand = [
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,680.0000,1280.0000];
```


Test Instance-25: TAS1C3D7 (Test Assembly Setup-Profile_1 Capacity-Profile_3 Demand-Series_7)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 7
primary_demand = [[104.0000,100.1600,100.0064,100.0003]];
secondary_demand = [
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,680.0000,1280.0000];
```

Test Instance-26: TAS1C3D8 (Test Assembly Setup-Profile_1 Capacity-Profile_3 Demand-Series_8)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 8
primary_demand = [[164.0000,102.5600,100.1024,100.0041]];
secondary_demand = [
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,680.0000,1280.0000];
```

Test Instance-27: TAS1C3D9 (Test Assembly Setup-Profile_1 Capacity-Profile_3 Demand-Series_9)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 9
primary_demand = [[296.0000,107.8400,100.3136,100.0125]];
secondary_demand = [
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,680.0000,1280.0000];
```

Test Instance-28: TAS1C4D1 (Test Assembly Setup-Profile_1 Capacity-Profile_4 Demand-Series_1)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 1
primary_demand = [[101.0000,100.0100,100.0001,100.0000]];
secondary_demand = [
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,485.7143,1280.0000];
```

Test Instance-29: TAS1C4D2 (Test Assembly Setup-Profile_1 Capacity-Profile_4 Demand-Series_2)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 2
primary_demand = [[116.0000,100.1600,100.0016,100.0000]];
secondary_demand = [
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,485.7143,1280.0000];
```

Test Instance-30: TAS1C4D3 (Test Assembly Setup-Profile_1 Capacity-Profile_4 Demand-Series_3)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 3
primary_demand = [[149.0000,100.4900,100.0049,100.0000]];
secondary_demand = [
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,485.7143,1280.0000];
```

Test Instance-31: TAS1C4D4 (Test Assembly Setup-Profile_1 Capacity-Profile_4 Demand-Series_4)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 4
primary_demand = [[102.2500,100.0506,100.0011,100.0000]];
secondary_demand = [
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,485.7143,1280.0000];
```

Test Instance-32: TAS1C4D5 (Test Assembly Setup-Profile_1 Capacity-Profile_4 Demand-Series_5)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 5
primary_demand = [[136.0000,100.8100,100.0182,100.0004]];
secondary_demand = [
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,485.7143,1280.0000];
```


Test Instance-33: TAS1C4D6 (Test Assembly Setup-Profile_1 Capacity-Profile_4 Demand-Series_6)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 6
primary_demand = [[210.2500,102.4806,100.0558,100.0013]];
secondary_demand = [
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,485.7143,1280.0000];
```

Test Instance-34: TAS1C4D7 (Test Assembly Setup-Profile_1 Capacity-Profile_4 Demand-Series_7)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 7
primary_demand = [[104.0000,100.1600,100.0064,100.0003]];
secondary_demand = [
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,485.7143,1280.0000];
```

Test Instance-35: TAS1C4D8 (Test Assembly Setup-Profile_1 Capacity-Profile_4 Demand-Series_8)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 8
primary_demand = [[164.0000,102.5600,100.1024,100.0041]];
secondary_demand = [
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,485.7143,1280.0000];
```

Test Instance-36: TAS1C4D9 (Test Assembly Setup-Profile_1 Capacity-Profile_4 Demand-Series_9)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 9
primary_demand = [[296.0000,107.8400,100.3136,100.0125]];
secondary_demand = [
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,485.7143,1280.0000];
```

Test Instance-37: TAS1C5D1 (Test Assembly Setup-Profile_1 Capacity-Profile_5 Demand-Series_1)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 1
primary_demand = [[101.0000,100.0100,100.0001,100.0000]];
secondary_demand = [
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,485.7143,711.1111];
```

Test Instance-38: TAS1C5D2 (Test Assembly Setup-Profile_1 Capacity-Profile_5 Demand-Series_2)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 2
primary_demand = [[116.0000,100.1600,100.0016,100.0000]];
secondary_demand = [
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,485.7143,711.1111];
```

Test Instance-39: TAS1C5D3 (Test Assembly Setup-Profile_1 Capacity-Profile_5 Demand-Series_3)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 3
primary_demand = [[149.0000,100.4900,100.0049,100.0000]];
secondary_demand = [
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,485.7143,711.1111];
```

Test Instance-40: TAS1C5D4 (Test Assembly Setup-Profile_1 Capacity-Profile_5 Demand-Series_4)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 4
primary_demand = [[102.2500,100.0506,100.0011,100.0000]];
secondary_demand = [
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,485.7143,711.1111];
```


Test Instance-41: TAS1C5D5 (Test Assembly Setup-Profile_1 Capacity-Profile_5 Demand-Series_5)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 5
primary_demand = [[136.0000,100.8100,100.0182,100.0004]];
secondary_demand = [
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,485.7143,711.1111];
```

Test Instance-42: TAS1C5D6 (Test Assembly Setup-Profile_1 Capacity-Profile_5 Demand-Series_6)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 6
primary_demand = [[210.2500,102.4806,100.0558,100.0013]];
secondary_demand = [
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,485.7143,711.1111];
```

Test Instance-43: TAS1C5D7 (Test Assembly Setup-Profile_1 Capacity-Profile_5 Demand-Series_7)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 7
primary_demand = [[104.0000,100.1600,100.0064,100.0003]];
secondary_demand = [
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,485.7143,711.1111];
```

Test Instance-44: TAS1C5D8 (Test Assembly Setup-Profile_1 Capacity-Profile_5 Demand-Series_8)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 8
primary_demand = [[164.0000,102.5600,100.1024,100.0041]];
secondary_demand = [
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,485.7143,711.1111];
```

Test Instance-45: TAS1C5D9 (Test Assembly Setup-Profile_1 Capacity-Profile_5 Demand-Series_9)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 9
primary_demand = [[296.0000,107.8400,100.3136,100.0125]];
secondary_demand = [
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125]];

// Setup Profile - I
setuptime = [10,10,15,15,10,10,5,5,5,5];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,485.7143,711.1111];
```

Test Instance-1: TAS2C1D1 (Test Assembly Setup-Profile_2 Capacity-Profile_1 Demand-Series_1)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 1
primary_demand = [[101.0000,100.0100,100.0001,100.0000]];
secondary_demand = [
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,355.5556,755.5556];
```

Test Instance-2: TAS2C1D2 (Test Assembly Setup-Profile_2 Capacity-Profile_1 Demand-Series_2)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 2
primary_demand = [[116.0000,100.1600,100.0016,100.0000]];
secondary_demand = [
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,355.5556,755.5556];
```

Test Instance-3: TAS2C1D3 (Test Assembly Setup-Profile_2 Capacity-Profile_1 Demand-Series_3)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 3
primary_demand = [[149.0000,100.4900,100.0049,100.0000]];
secondary_demand = [
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,355.5556,755.5556];
```


Test Instance-4: TAS2C1D4 (Test Assembly Setup-Profile_2 Capacity-Profile_1 Demand-Series_4)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 4
primary_demand = [[102.2500,100.0506,100.0011,100.0000]];
secondary_demand = [
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,355.5556,755.5556];
```

Test Instance-5: TAS2C1D5 (Test Assembly Setup-Profile_2 Capacity-Profile_1 Demand-Series_5)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 5
primary_demand = [[136.0000,100.8100,100.0182,100.0004]];
secondary_demand = [
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,355.5556,755.5556];
```

Test Instance-6: TAS2C1D6 (Test Assembly Setup-Profile_2 Capacity-Profile_1 Demand-Series_6)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 6
primary_demand = [[210.2500,102.4806,100.0558,100.0013]];
secondary_demand = [
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,355.5556,755.5556];
```

Test Instance-7: TAS2C1D7 (Test Assembly Setup-Profile_2 Capacity-Profile_1 Demand-Series_7)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 7
primary_demand = [[104.0000,100.1600,100.0064,100.0003]];
secondary_demand = [
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,355.5556,755.5556];
```

Test Instance-8: TAS2C1D8 (Test Assembly Setup-Profile_2 Capacity-Profile_1 Demand-Series_8)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 8
primary_demand = [[164.0000,102.5600,100.1024,100.0041]];
secondary_demand = [
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,355.5556,755.5556];
```

Test Instance-9: TAS2C1D9 (Test Assembly Setup-Profile_2 Capacity-Profile_1 Demand-Series_9)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 9
primary_demand = [[296.0000,107.8400,100.3136,100.0125]];
secondary_demand = [
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - I (90%)
productstagecapacity = [122.2222,355.5556,755.5556];
```

Test Instance-10: TAS2C2D1 (Test Assembly Setup-Profile_2 Capacity-Profile_2 Demand-Series_1)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 1
primary_demand = [[101.0000,100.0100,100.0001,100.0000]];
secondary_demand = [
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,457.1429, 971.4286];
```

Test Instance-11: TAS2C2D2 (Test Assembly Setup-Profile_2 Capacity-Profile_2 Demand-Series_2)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 2
primary_demand = [[116.0000,100.1600,100.0016,100.0000]];
secondary_demand = [
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,457.1429, 971.4286];
```


Test Instance-12: TAS2C2D3 (Test Assembly Setup-Profile_2 Capacity-Profile_2 Demand-Series_3)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 3
primary_demand = [[149.0000,100.4900,100.0049,100.0000]];
secondary_demand = [
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,457.1429, 971.4286];
```

Test Instance-13: TAS2C2D4 (Test Assembly Setup-Profile_2 Capacity-Profile_2 Demand-Series_4)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 4
primary_demand = [[102.2500,100.0506,100.0011,100.0000]];
secondary_demand = [
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,457.1429, 971.4286];
```

Test Instance-14: TAS2C2D5 (Test Assembly Setup-Profile_2 Capacity-Profile_2 Demand-Series_5)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 5
primary_demand = [[136.0000,100.8100,100.0182,100.0004]];
secondary_demand = [
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,457.1429, 971.4286];
```

Test Instance-15: TAS2C2D6 (Test Assembly Setup-Profile_2 Capacity-Profile_2 Demand-Series_6)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 6
primary_demand = [[210.2500,102.4806,100.0558,100.0013]];
secondary_demand = [
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,457.1429, 971.4286];
```

Test Instance-16: TAS2C2D7 (Test Assembly Setup-Profile_2 Capacity-Profile_2 Demand-Series_7)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 7
primary_demand = [[104.0000,100.1600,100.0064,100.0003]];
secondary_demand = [
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,457.1429, 971.4286];
```

Test Instance-17: TAS2C2D8 (Test Assembly Setup-Profile_2 Capacity-Profile_2 Demand-Series_8)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 8
primary_demand = [[164.0000,102.5600,100.1024,100.0041]];
secondary_demand = [
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,457.1429, 971.4286];
```

Test Instance-18: TAS2C2D9 (Test Assembly Setup-Profile_2 Capacity-Profile_2 Demand-Series_9)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 9
primary_demand = [[296.0000,107.8400,100.3136,100.0125]];
secondary_demand = [
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - 2 (70%)
productstagecapacity = [157.1429,457.1429, 971.4286];
```

Test Instance-19: TAS2C3D1 (Test Assembly Setup-Profile_2 Capacity-Profile_3 Demand-Series_1)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 1
primary_demand = [[101.0000,100.0100,100.0001,100.0000]];
secondary_demand = [
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,640.0000,1360.0000];
```


Test Instance-20: TAS2C3D2 (Test Assembly Setup-Profile_2 Capacity-Profile_3 Demand-Series_2)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 2
primary_demand = [[116.0000,100.1600,100.0016,100.0000]];
secondary_demand = [
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,640.0000,1360.0000];
```

Test Instance-21: TAS2C3D3 (Test Assembly Setup-Profile_2 Capacity-Profile_3 Demand-Series_3)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 3
primary_demand = [[149.0000,100.4900,100.0049,100.0000]];
secondary_demand = [
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,640.0000,1360.0000];
```

Test Instance-22: TAS2C3D4 (Test Assembly Setup-Profile_2 Capacity-Profile_3 Demand-Series_4)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 4
primary_demand = [[102.2500,100.0506,100.0011,100.0000]];
secondary_demand = [
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,640.0000,1360.0000];
```

Test Instance-23: TAS2C3D5 (Test Assembly Setup-Profile_2 Capacity-Profile_3 Demand-Series_5)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 5
primary_demand = [[136.0000,100.8100,100.0182,100.0004]];
secondary_demand = [
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,640.0000,1360.0000];
```

Test Instance-24: TAS2C3D6 (Test Assembly Setup-Profile_2 Capacity-Profile_3 Demand-Series_6)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 6
primary_demand = [[210.2500,102.4806,100.0558,100.0013]];
secondary_demand = [
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,640.0000,1360.0000];
```

Test Instance-25: TAS2C3D7 (Test Assembly Setup-Profile_2 Capacity-Profile_3 Demand-Series_7)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 7
primary_demand = [[104.0000,100.1600,100.0064,100.0003]];
secondary_demand = [
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,640.0000,1360.0000];
```

Test Instance-26: TAS2C3D8 (Test Assembly Setup-Profile_2 Capacity-Profile_3 Demand-Series_8)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 8
primary_demand = [[164.0000,102.5600,100.1024,100.0041]];
secondary_demand = [
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,640.0000,1360.0000];
```

Test Instance-27: TAS2C3D9 (Test Assembly Setup-Profile_2 Capacity-Profile_3 Demand-Series_9)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 9
primary_demand = [[296.0000,107.8400,100.3136,100.0125]];
secondary_demand = [
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - III (50%)
productstagecapacity = [220.0000,640.0000,1360.0000];
```


Test Instance-28: TAS2C4D1 (Test Assembly Setup-Profile_2 Capacity-Profile_4 Demand-Series_1)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 1
primary_demand = [[101.0000,100.0100,100.0001,100.0000]];
secondary_demand = [
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,457.1429,1360.0000];
```

Test Instance-29: TAS2C4D2 (Test Assembly Setup-Profile_2 Capacity-Profile_4 Demand-Series_2)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 2
primary_demand = [[116.0000,100.1600,100.0016,100.0000]];
secondary_demand = [
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,457.1429,1360.0000];
```

Test Instance-30: TAS2C4D3 (Test Assembly Setup-Profile_2 Capacity-Profile_4 Demand-Series_3)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 3
primary_demand = [[149.0000,100.4900,100.0049,100.0000]];
secondary_demand = [
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,457.1429,1360.0000];
```

Test Instance-31: TAS2C4D4 (Test Assembly Setup-Profile_2 Capacity-Profile_4 Demand-Series_4)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 4
primary_demand = [[102.2500,100.0506,100.0011,100.0000]];
secondary_demand = [
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,457.1429,1360.0000];
```

Test Instance-32: TAS2C4D5 (Test Assembly Setup-Profile_2 Capacity-Profile_4 Demand-Series_5)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 5
primary_demand = [[136.0000,100.8100,100.0182,100.0004]];
secondary_demand = [
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,457.1429,1360.0000];
```

Test Instance-33: TAS2C4D6 (Test Assembly Setup-Profile_2 Capacity-Profile_4 Demand-Series_6)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 6
primary_demand = [[210.2500,102.4806,100.0558,100.0013]];
secondary_demand = [
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,457.1429,1360.0000];
```

Test Instance-34: TAS2C4D7 (Test Assembly Setup-Profile_2 Capacity-Profile_4 Demand-Series_7)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 7
primary_demand = [[104.0000,100.1600,100.0064,100.0003]];
secondary_demand = [
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,457.1429,1360.0000];
```

Test Instance-35: TAS2C4D8 (Test Assembly Setup-Profile_2 Capacity-Profile_4 Demand-Series_8)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 8
primary_demand = [[164.0000,102.5600,100.1024,100.0041]];
secondary_demand = [
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,457.1429,1360.0000];
```


Test Instance-36: TAS2C4D9 (Test Assembly Setup-Profile_2 Capacity-Profile_4 Demand-Series_9)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 9
primary_demand = [[296.0000,107.8400,100.3136,100.0125]];
secondary_demand = [
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - IV (90%, 70%, 50%)
productstagecapacity = [122.2222,457.1429,1360.0000];
```

Test Instance-37: TAS2C5D1 (Test Assembly Setup-Profile_2 Capacity-Profile_5 Demand-Series_1)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 1
primary_demand = [[101.0000,100.0100,100.0001,100.0000]];
secondary_demand = [
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000],
    [101.0000,100.0100,100.0001,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,457.1429,755.5556];
```

Test Instance-38: TAS2C5D2 (Test Assembly Setup-Profile_2 Capacity-Profile_5 Demand-Series_2)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 2
primary_demand = [[116.0000,100.1600,100.0016,100.0000]];
secondary_demand = [
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000],
    [116.0000,100.1600,100.0016,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,457.1429,755.5556];
```

Test Instance-39: TAS2C5D3 (Test Assembly Setup-Profile_2 Capacity-Profile_5 Demand-Series_3)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 3
primary_demand = [[149.0000,100.4900,100.0049,100.0000]];
secondary_demand = [
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000],
    [149.0000,100.4900,100.0049,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,457.1429,755.5556];
```

Test Instance-40: TAS2C5D4 (Test Assembly Setup-Profile_2 Capacity-Profile_5 Demand-Series_4)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 4
primary_demand = [[102.2500,100.0506,100.0011,100.0000]];
secondary_demand = [
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000],
    [102.2500,100.0506,100.0011,100.0000]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,457.1429,755.5556];
```

Test Instance-41: TAS2C5D5 (Test Assembly Setup-Profile_2 Capacity-Profile_5 Demand-Series_5)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 5
primary_demand = [[136.0000,100.8100,100.0182,100.0004]];
secondary_demand = [
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004],
    [136.0000,100.8100,100.0182,100.0004]];

// Setup Profile - II
setup_time = [10,10,5,5,10,10,15,15,15,15];
setup_cost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,457.1429,755.5556];
```

Test Instance-42: TAS2C5D6 (Test Assembly Setup-Profile_2 Capacity-Profile_5 Demand-Series_6)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 6
primary_demand = [[210.2500,102.4806,100.0558,100.0013]];
secondary_demand = [
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013],
    [210.2500,102.4806,100.0558,100.0013]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,457.1429,755.5556];
```

Test Instance-43: TAS2C5D7 (Test Assembly Setup-Profile_2 Capacity-Profile_5 Demand-Series_7)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 7
primary_demand = [[104.0000,100.1600,100.0064,100.0003]];
secondary_demand = [
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003],
    [104.0000,100.1600,100.0064,100.0003]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,457.1429,755.5556];
```


Test Instance-44: TAS2C5D8 (Test Assembly Setup-Profile_2 Capacity-Profile_5 Demand-Series_8)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 8
primary_demand = [[164.0000,102.5600,100.1024,100.0041]];
secondary_demand = [
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041],
    [164.0000,102.5600,100.1024,100.0041]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,457.1429,755.5556];
```

Test Instance-45: TAS2C5D9 (Test Assembly Setup-Profile_2 Capacity-Profile_5 Demand-Series_9)

```
FP = 1;
RP = 10;
J = 10;
L = 3;
T = 4;
S = 12;
allproductsonstage1 = {5,6,7,8,9,10};
allproductsonstage2 = {2,3,4};
allproductsonstage3 = {1};
family1stage1 = {5,6};
family2stage1 = {7,8};
family3stage1 = {9,10};
family1stage2 = {2};
family2stage2 = {3};
family3stage2 = {4};
family1stage3 = {1};
microperiods1tomacroperiod = {1,2,3};
microperiods2tomacroperiod = {4,5,6};
microperiods3tomacroperiod = {7,8,9};
microperiods4tomacroperiod = {10,11,12};

min_lotsize = 1;
production_cost = 1;
production_time = 1;
standby_cost = 1;
BOM = 1;
BigM = 10000;
holdingcost = [10,3,3,3,1,1,1,1,1,1];

// Product Demand - Series# 9
primary_demand = [[296.0000,107.8400,100.3136,100.0125]];
secondary_demand = [
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125],
    [296.0000,107.8400,100.3136,100.0125]];

// Setup Profile - II
setuptime = [10,10,5,5,10,10,15,15,15,15];
setupcost = [50,50,50,50,50,50,50,50,50,50];

// Capacity Utilization Profile - V (50%, 70%, 90%)
productstagecapacity = [220.0000,457.1429,755.5556];
```