

# Homework 2

May 28, 2019

## 1. 3.2-3

```
# Model File
var x1 >= 0, <= 1;
var x2 >= 0;

maximize Z:
    4500*x1+4500*x2;

subject to c1:
    5000*x1+4000*x2<=6000;

subject to c2:
    400*x1+500*x2<=600;

# Solution
MINOS 5.51: optimal solution found.
3 iterations, objective 6000
x1 = 0.666667
x2 = 0.666667
```

## 2. 4.1-1

### • Graphical Solutions

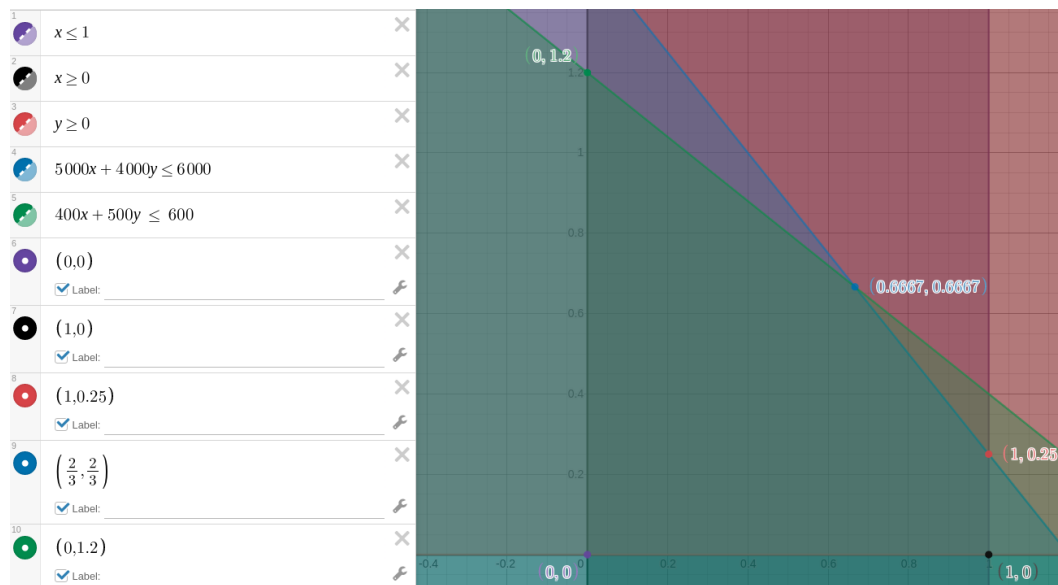


Figure 1: Graphical Solutions

- Calculated Z Values

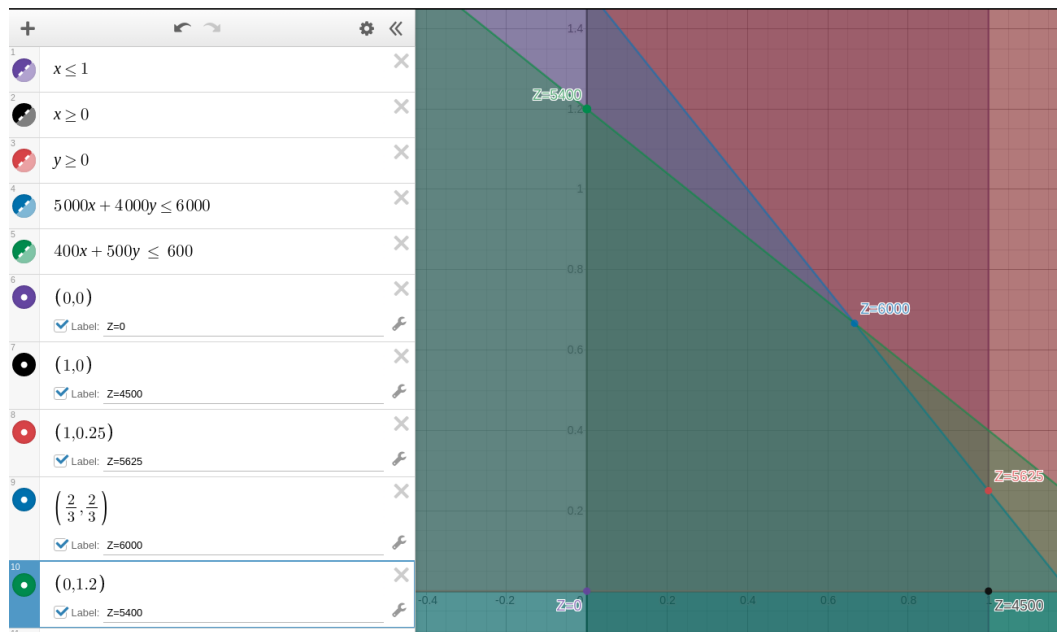


Figure 2: Calculated Z Values

- Simplex Method

- Start at  $(0,0)$ .
- Check for optimality - Fails
- Follow edge to  $(4/3,0)$
- Check for optimality - Passes
- Optionally continue to  $(2/3, 2/3)$  depending on implementation

## 3. 4.1-2

- Ampl

```
# Model File
var x1 >= 0;
var x2 >= 0;

maximize Z:
    x1 + 2*x2;

subject to c1:
    x1 + 3*x2 <= 9;
subject to c2:
    x1 + x2 <= 4;

# Solution
```

```

MINOS 5.51: optimal solution found.
2 iterations, objective 6.5
x1 = 1.5
x2 = 2.5

```

### • Graphical Solutions

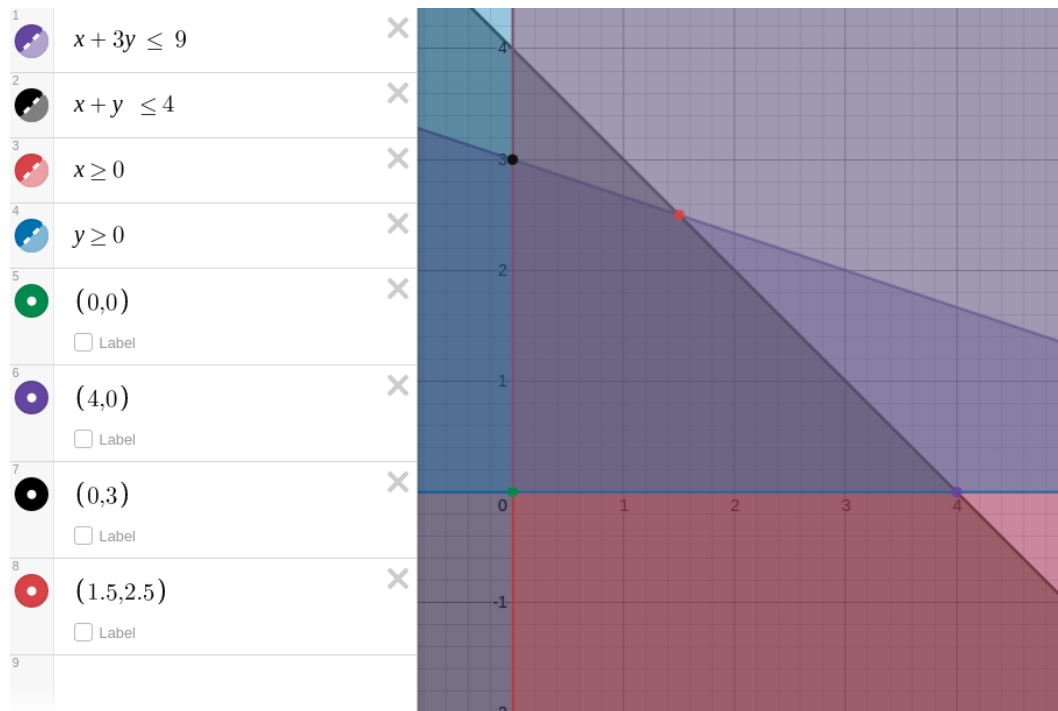


Figure 3: Graphical Solution

### 4. Calculated Z Values

### 5. Simplex Method

- Start at  $(0,0)$
- Check for optimality - Fails
- Follow Edge to  $(0,3)$
- Check for optimality - Fails
- Follow edge to  $(1.5, 2.5)$
- Check for Optimality - Succeeds

### 6. 4.1-3

- Ampl

```

# Model
var x1 >= 0, <= 4;
var x2 >= 0;

```

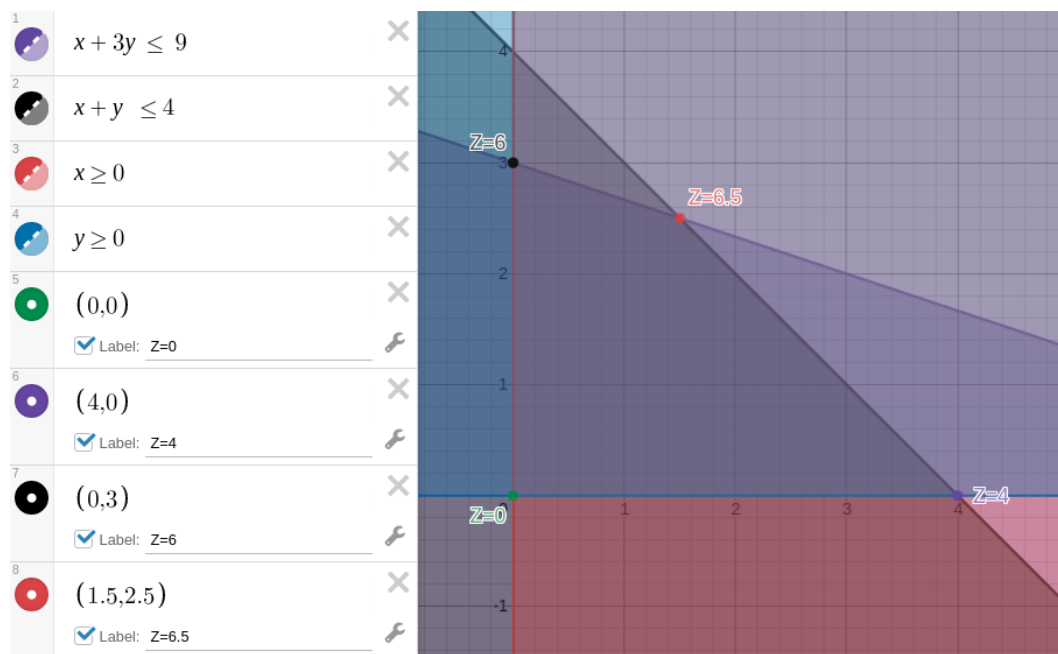


Figure 4: Calculated Z Values

```

maximize Z:
  ^I3*x1 + 2*x2;

subject to c2:
  ^Ix1 + 3*x2 <= 15;

subject to c3:
  ^I2*x1 + x2 <= 10;

# Solution
MINOS 5.51: optimal solution found.
3 iterations, objective 17
x1 = 3
x2 = 4

```

- Graphical Solutions
- Calculated Z Values
- Simplex Method
  - Start at  $(0,0)$
  - Check for optimality - Fails
  - Follow Edge to  $(4,0)$
  - Check for optimality - Fails
  - Follow edge to  $(4,2)$

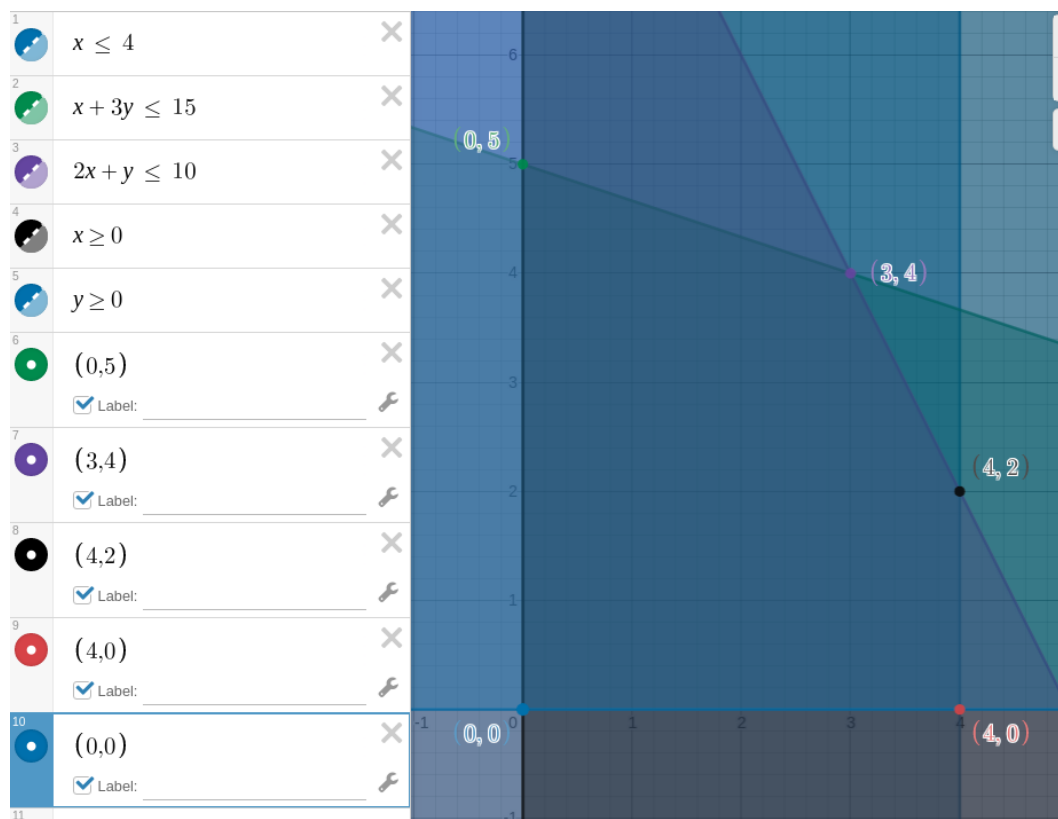


Figure 5: Graphical Solutions

- Check for Optimality - Fails
- Follow edge to (3,4)
- Check for Optimality - Succeeds

## 7. 4.1-4

- (a) True - This is the definition of an optimal solution
- (b) False - In certain cases every point along an edge could be optimal solutions.
- (c) True - In the case where a constraint runs perpendicular to the Z function, this will be the case.

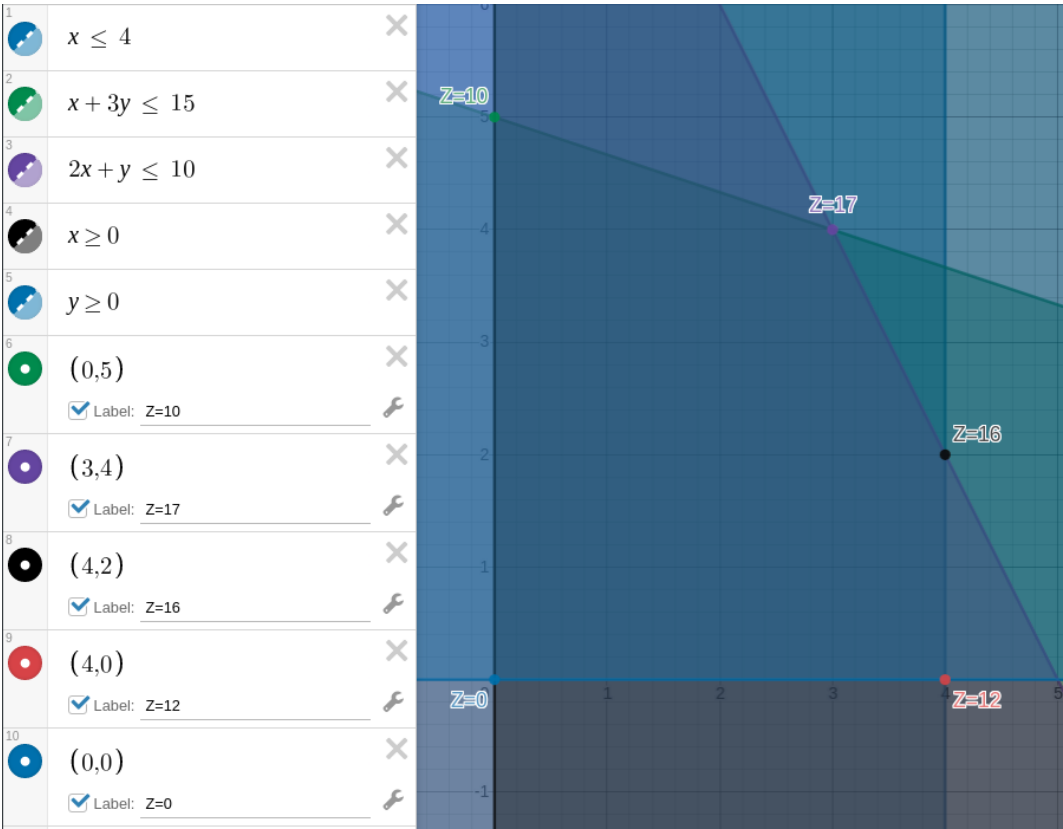


Figure 6: Calculated Z Values