1st task:

①

$Max = 2000x_1 + 3000x_2$

$x_1 = 2A, 1B$

$x_2 = 2B, 1A$

Constraints:
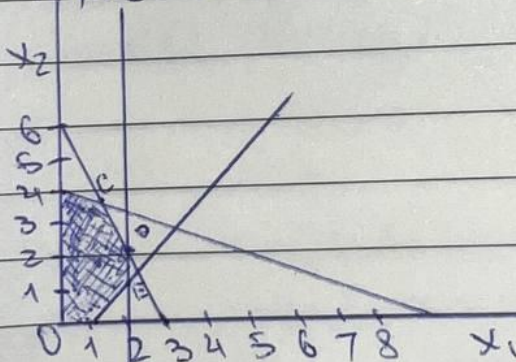
$2x_1 + x_2 \leq 6$

$x_1 + 2x_2 \leq 8$

$x_1 - x_2 \leq 1$

$x_1 \leq 2$

$x_1, x_2 \geq 0.$

↖ constraint

$2x_1 + x_2 = 6$

$x_1 + 2x_2 = 8 \cdot 2;$

$\begin{array}{l} 2x_1 + x_2 = 6 \\ 2x_1 + 4x_2 = 16 \end{array} \Rightarrow 3x_2 = 10$

$x_2 = 3\frac{1}{3}; x_1 = 1\frac{1}{3}$

$C(1\frac{1}{3}; 3\frac{1}{3}) = 1\frac{1}{3} \cdot 2000 + 3\frac{1}{3} \cdot 3000 = 12666.6\overline{7}$

2nd task:

Panchenko M.

②

$Z - 4x - 5x_2 - 2x_3 - x_4 = 0$

$3x_1 + 5x_2 + 4x_3 + x_4 + S = 130$

$10x_1 + 4x_2 + 7x_3 + 2x_4 + S_2 = 70$

$9x_1 + 5x_2 + 2x_3 + 2x_4 + S_3 = 65.$

Z	x_1	x_2	x_3	x_4	S	S_2	S_3	rhs	Ratio test	BV
1	-4	-5	-2	-1	0	0	0	0		$Z = 0$
0	3	5	4	1	1	0	0	130	130/5 = 26	$S = 130$
0	10	4	7	2	0	0	0	70	70/4 = 17.5	$S_2 = 70$
0	9	⑤	2	2	0	0	1	65	65/5 = 13	$S_3 = 65$

Z	x_1	x_2	x_3	x_4	S_1	S_2	S_3	rhs		BV.
1	5	0	0	2	1	0	0	1	65	$Z = 65$
0	-6	0	2	-1	1	0	-1	65		$S_1 = 65$
0	-28	0	5.4	0.4	0	1	-0.8	18		$S_2 = 18$
0	1.8	1	0.4	0.40	0	0	0.2	13		$x_2 = 13$

$Max = 65 ; X_2 = 13 ; X_1 = X_3 = X_4 = 0.$

3rd task:

```python
soldier_price = 27
soldier_material_cost = 10
soldier_labor_cost = 14
train_price = 21
train_material_cost = 9
train_labor_cost = 10
hours_finishing = 100
hours_carpentry = 80
max_soldiers_demand = 40
optimized_soldiers = 0
optimized_trains = 0
max_profit = 0
for soldiers in range(max_soldiers_demand + 1):
    for trains in range((hours_carpentry - soldiers) + 1):
        if 2*soldiers + trains <= hours_finishing:
            profit = (soldiers * (soldier_price - soldier_material_cost - soldier_labor_cost) +
                        trains * (train_price - train_material_cost - train_labor_cost))
            if profit > max_profit:
                max_profit = profit
                optimized_soldiers = soldiers
                optimized_trains = trains
print("Optimized number of soldiers per week:", optimized_soldiers)
print("Optimized number of trains per week:", optimized_trains)
print("Weekly profit: $", max_profit)
```

✓ 0.0s   Python

```
Optimized number of soldiers per week: 20
Optimized number of trains per week: 60
Weekly profit: $ 180
```