Name, group no:

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1. [10 points] Find the general solution of the differential equation $y'' + 4y' + 5y = 10x + 23$.

Name, group no:

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2. [10 points] Find the general solution of the difference equation $y_{t+2} - 6y_{t+1} + 9y_t = 8$.

Name, group no:

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3. [10 points] Find all pure and mixed Nash equilibria in the following game

	d	e	f
a	(5, 6)	(1, 0)	(2, 2)
b	(1, 1)	(4, 4)	(2, 2)
c	(2, 4)	(2, 2)	(1, 3)

Name, group no:

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4. [10 points] Solve the following linear programming problem:

$$\begin{cases} 2x_1 + 2x_2 + 5x_3 \to \min \\ x_1 \geq 0, x_2 \geq 0, x_3 \geq 0 \\ 3x_1 + 5x_2 + x_3 \geq 9 \\ 5x_1 + 3x_2 + x_3 \geq 8 \end{cases}.$$

Name, group no:

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5. [10 points] Expand the function $f(x) = \exp(1 - \cos^2(\ln(1 + 2x)))$ as a power series in terms up to x^5. State the range for which your expansion is valid.

Name, group no:

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6. [10 points] Sketch the set $\mathrm{Re}(z \cdot (1+i)) + z\bar{z} = 0$ on the complex plane.

Name, group no:

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7. A firm with the production function $y = x_1x_2 + x_1 + x_2$ employs factors x_1, $x_2 \geq 0$.

a) [15 points] Minimize the function $100x_1 + x_2$ subject to constraint $x_1x_2 + x_1 + x_2 \geq y$, where $y \geq 0$ is the output. Justify the found optimal bundle(s).

b) [5 points] Find the total costs function $TC(y)$.

Name, group no:

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8. Solve second-order differential equation $xy'' - (2x+1)y' + 2y = 0$ following hints:

a) [5 points] Find a particular solution by substituting for $y(x)$ a polynomial $\tilde{y}(x)$ with the undetermined coefficients starting with the smallest degree possible.

b) [15 points] Let $\tilde{y}(x)$ be the solution found in a), introduce new function $z(x) = y(x)/\tilde{y}(x)$. Derive equation for z and solve it. Then find y.

Name, group no:

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1. [10 points] Find the general solution of the differential equation $y'' + 4y' + 5y = 10x + 28$.

Name, group no:

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2. [10 points] Find the general solution of the difference equation $y_{t+2} - 6y_{t+1} + 9y_t = 12$.

Name, group no:

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3. [10 points] Find all pure and mixed Nash equilibria in the following game

	d	e	f
a	(4, 6)	(0, 0)	(1, 2)
b	(0, 1)	(3, 4)	(1, 2)
c	(1, 4)	(1, 2)	(0, 3)

Name, group no:

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4. [10 points] Solve the following linear programming problem:

$$\begin{cases} 2x_1 + 2x_2 + 6x_3 \to \min \\ x_1 \geq 0, x_2 \geq 0, x_3 \geq 0 \\ 3x_1 + 5x_2 + x_3 \geq 9 \\ 5x_1 + 3x_2 + x_3 \geq 8 \end{cases}.$$

Name, group no:

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5. [10 points] Expand the function $f(x) = \exp(1 - \cos^2(\ln(1 + 3x)))$ as a power series in terms up to x^5. State the range for which your expansion is valid.

Name, group no:

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6. [10 points] Sketch the set $\mathrm{Re}(z \cdot (1+i)) + z\bar{z} = 0$ on the complex plane.

Name, group no:

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7. A firm with the production function $y = x_1x_2 + x_1 + x_2$ employs factors x_1, $x_2 \geq 0$.

a) [15 points] Minimize the function $100x_1 + x_2$ subject to constraint $x_1x_2 + x_1 + x_2 \geq y$, where $y \geq 0$ is the output. Justify the found optimal bundle(s).

b) [5 points] Find the total costs function $TC(y)$.

Name, group no:

. . . . . .

8. Solve second-order differential equation $xy'' - (2x+1)y' + 2y = 0$ following hints:

a) [5 points] Find a particular solution by substituting for $y(x)$ a polynomial $\tilde{y}(x)$ with the undetermined coefficients starting with the smallest degree possible.

b) [15 points] Let $\tilde{y}(x)$ be the solution found in a), introduce new function $z(x) = y(x)/\tilde{y}(x)$. Derive equation for z and solve it. Then find y.

Name, group no:

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1. [10 points] Find the general solution of the differential equation $y'' + 4y' + 5y = 10x + 33$.

Name, group no:

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2. [10 points] Find the general solution of the difference equation $y_{t+2} - 6y_{t+1} + 9y_t = 16$.

Name, group no:

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3. [10 points] Find all pure and mixed Nash equilibria in the following game

	d	e	f
a	(6, 6)	(2, 0)	(3, 2)
b	(2, 1)	(5, 4)	(3, 2)
c	(3, 4)	(3, 2)	(2, 3)

Name, group no:

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4. [10 points] Solve the following linear programming problem:

$$\begin{cases} 2x_1 + 2x_2 + 7x_3 \to \min \\ x_1 \geq 0, x_2 \geq 0, x_3 \geq 0 \\ 3x_1 + 5x_2 + x_3 \geq 9 \\ 5x_1 + 3x_2 + x_3 \geq 8 \end{cases}.$$

Name, group no:

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5. [10 points] Expand the function $f(x) = \exp(1 - \cos^2(\ln(1 + 4x)))$ as a power series in terms up to x^5. State the range for which your expansion is valid.

Name, group no:

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6. [10 points] Sketch the set $\mathrm{Re}(z \cdot (1+i)) + z\bar{z} = 0$ on the complex plane.

Name, group no:

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7. A firm with the production function $y = x_1x_2 + x_1 + x_2$ employs factors x_1, $x_2 \geq 0$.

a) [15 points] Minimize the function $100x_1 + x_2$ subject to constraint $x_1x_2 + x_1 + x_2 \geq y$, where $y \geq 0$ is the output. Justify the found optimal bundle(s).

b) [5 points] Find the total costs function $TC(y)$.

Name, group no:

. . . . . .

8. Solve second-order differential equation $xy'' - (2x+1)y' + 2y = 0$ following hints:

a) [5 points] Find a particular solution by substituting for $y(x)$ a polynomial $\tilde{y}(x)$ with the undetermined coefficients starting with the smallest degree possible.

b) [15 points] Let $\tilde{y}(x)$ be the solution found in a), introduce new function $z(x) = y(x)/\tilde{y}(x)$. Derive equation for z and solve it. Then find y.

Name, group no:

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1. [10 points] Find the general solution of the differential equation $y'' + 4y' + 5y = 10x + 38$.

Name, group no:

. . . . . .

2. [10 points] Find the general solution of the difference equation $y_{t+2} - 6y_{t+1} + 9y_t = 20$.

Name, group no:

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3. [10 points] Find all pure and mixed Nash equilibria in the following game

	d	e	f
a	(5, 7)	(1, 1)	(2, 3)
b	(1, 2)	(4, 5)	(2, 3)
c	(2, 5)	(2, 3)	(1, 4)

Name, group no:

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4. [10 points] Solve the following linear programming problem:

$$\begin{cases} 2x_1 + 2x_2 + 8x_3 \to \min \\ x_1 \geq 0, x_2 \geq 0, x_3 \geq 0 \\ 3x_1 + 5x_2 + x_3 \geq 9 \\ 5x_1 + 3x_2 + x_3 \geq 8 \end{cases}.$$

Name, group no:

. . . . . .

5. [10 points] Expand the function $f(x) = \exp(1 - \cos^2(\ln(1 + 5x)))$ as a power series in terms up to x^5. State the range for which your expansion is valid.

Name, group no:

. . . . . .

6. [10 points] Sketch the set $\mathrm{Re}(z \cdot (1+i)) + z\bar{z} = 0$ on the complex plane.

Name, group no:

. . . . . .

7. A firm with the production function $y = x_1x_2 + x_1 + x_2$ employs factors x_1, $x_2 \geq 0$.

a) [15 points] Minimize the function $100x_1 + x_2$ subject to constraint $x_1x_2 + x_1 + x_2 \geq y$, where $y \geq 0$ is the output. Justify the found optimal bundle(s).

b) [5 points] Find the total costs function $TC(y)$.

Name, group no:

. . . . . .

8. Solve second-order differential equation $xy'' - (2x+1)y' + 2y = 0$ following hints:

a) [5 points] Find a particular solution by substituting for $y(x)$ a polynomial $\tilde{y}(x)$ with the undetermined coefficients starting with the smallest degree possible.

b) [15 points] Let $\tilde{y}(x)$ be the solution found in a), introduce new function $z(x) = y(x)/\tilde{y}(x)$. Derive equation for z and solve it. Then find y.