(1) Let $f(x) = 2x - 3$ and $x_0 = 5$. Compute $f^{10}(x_0)$.
A) 2047, B) 2050, C) 2048, D) 2051, E) 2049

(2) Compute $\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 4 & 2 \end{pmatrix}^{-1}$. How much is $a + 2b + 3c + 4d$?
A) -5, B) -6, C) -2, D) -3, E) -4

(3) One of the eigenvectors of the matrix $\begin{pmatrix} 1 & 3 \\ 3 & 1 \end{pmatrix}$ is $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$. What is the corresponding eigenvalue?
A) -2, B) -1, C) -3, D) 0, E) -4

(4) Let $f(x) = 5x + 7$. Compute $f^{-1}(x) = cx + d$. How much is $2c + 3d$?
A) $-\frac{14}{5}$, B) $-\frac{18}{5}$, C) $-\frac{17}{5}$, D) $-\frac{16}{5}$, E) $-\frac{19}{5}$

(5) One of the eigenvalues of the matrix $\begin{pmatrix} 1 & 4 \\ 0 & 2 \end{pmatrix}$ is 2. Compute the correspondig eigenvector $\begin{pmatrix} x \\ y \end{pmatrix}$. How much is x/y ?
A) -1, B) -4, C) -3, D) 0, E) -2

(6) Let us take the following mapping $\phi : \begin{pmatrix} x \\ y \end{pmatrix} \to \begin{pmatrix} 2 & 3 \\ z & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$. How much is z, if ϕ is not invertible?
A) $\frac{7}{3}$, B) $\frac{2}{3}$, C) $\frac{5}{3}$, D) $\frac{4}{3}$, E) $\frac{8}{3}$

$_1{}^1$: $_2{}^1$: $_3{}^1$: $_4{}^1$: $_5{}^1$: $_6{}^1$:

(1) Compute $\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 2 & 3 \\ 0 & 1 \end{pmatrix}^{-1}$. How much is $a+2b+3c+4d$?
A) $\frac{1}{2}$, B) $\frac{5}{2}$, C) $\frac{7}{2}$, D) $-\frac{1}{2}$, E) $\frac{3}{2}$

(2) Let us take the following mapping $\phi : \begin{pmatrix} x \\ y \end{pmatrix} \to \begin{pmatrix} 3 & z \\ 1 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$. How much is z, if ϕ is not invertible?
A) 10, B) 8, C) 9, D) 7, E) 6

(3) Suppose that the dynamics of a two state stochastic system is generated by the matrix $\begin{pmatrix} \frac{1}{10} & \frac{9}{10} \\ \frac{9}{10} & \frac{1}{10} \end{pmatrix}$. Find the steady state probability vector $\begin{pmatrix} p_1 \\ p_2 \end{pmatrix}$. How much is p_1/p_2 ?
A) 3, B) 0, C) 1, D) 2, E) -1

(4) One of the eigenvectors of the matrix $\begin{pmatrix} 3 & 5 \\ 5 & 3 \end{pmatrix}$ is $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$. What is the corresponding eigenvalue?
A) -3, B) -4, C) -2, D) -6, E) -5

(5) Let $f(x) = 5x + 6$. Compute $f^{-1}(x) = cx + d$. How much is $2c + 3d$?
A) $-\frac{19}{5}$, B) $-\frac{14}{5}$, C) $-\frac{17}{5}$, D) $-\frac{16}{5}$, E) $-\frac{18}{5}$

(6) Let $f(x) = 2x - 5$ and $x_0 = 6$. Compute $f^9(x_0)$.
A) 518, B) 515, C) 519, D) 516, E) 517

1^1: 2^1: 3^1: 4^1: 5^1: 6^1:

(1) Compute $\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 4 & 0 \\ 2 & 1 \end{pmatrix}^{-1}$. How much is $a+2b+3c+4d$?
A) $\frac{19}{4}$, B) $\frac{15}{4}$, C) $\frac{11}{4}$, D) $\frac{17}{4}$, E) $\frac{13}{4}$

(2) One of the eigenvalues of the matrix $\begin{pmatrix} 2 & 5 \\ 0 & 4 \end{pmatrix}$ is 4. Compute the correspondig eigenvector $\begin{pmatrix} x \\ y \end{pmatrix}$. How much is x/y ?
A) $-\frac{3}{2}$, B) $\frac{1}{2}$, C) $-\frac{7}{2}$, D) $-\frac{5}{2}$, E) $-\frac{1}{2}$

(3) One of the eigenvectors of the matrix $\begin{pmatrix} 1 & 3 \\ 3 & 1 \end{pmatrix}$ is $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$. What is the corresponding eigenvalue?
A) -5, B) -4, C) -3, D) -1, E) -2

(4) Let $f(x) = 2x - 4$ and $x_0 = 6$. Compute $f^{11}(x_0)$.
A) 4104, B) 4102, C) 4103, D) 4101, E) 4100

(5) Let $f(x) = 2x + 3$. Compute $f^{-1}(x) = cx + d$. How much is $2c + 3d$?
A) $\frac{1}{2}$, B) $-\frac{3}{2}$, C) $-\frac{1}{2}$, D) $-\frac{7}{2}$, E) $-\frac{5}{2}$

(6) Let us take the following mapping $\phi : \begin{pmatrix} x \\ y \end{pmatrix} \to \begin{pmatrix} 3 & z \\ 2 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$. How much is z, if ϕ is not invertible?
A) 3, B) 5, C) 7, D) 6, E) 4

$_1^1$: $_2^1$: $_3^1$: $_4^1$: $_5^1$: $_6^1$:

(1) Let $f(x) = 2x - 3$ and $x_0 = 7$. Compute $f^{10}(x_0)$.
A) 4097, B) 4101, C) 4100, D) 4099, E) 4098

(2) Compute $\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 2 & 0 \\ 3 & 4 \end{pmatrix}^{-1}$. How much is $a + 2b + 3c + 4d$?
A) $\frac{5}{8}$, B) $\frac{1}{8}$, C) $\frac{3}{8}$, D) $-\frac{1}{8}$, E) $-\frac{3}{8}$

(3) Let us take the following mapping $\phi : \begin{pmatrix} x \\ y \end{pmatrix} \to \begin{pmatrix} 2 & 2 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$. How much is the signed area of the image of the unit square?
A) 2, B) 3, C) 5, D) 4, E) 6

(4) One of the eigenvalues of the matrix $\begin{pmatrix} 4 & 1 \\ 0 & 7 \end{pmatrix}$ is 7. Compute the correspondig eigenvector $\begin{pmatrix} x \\ y \end{pmatrix}$. How much is x/y ?
A) $-\frac{7}{4}$, B) $-\frac{3}{4}$, C) $-\frac{1}{4}$, D) $-\frac{5}{4}$, E) $\frac{1}{4}$

(5) Let $f(x) = 3x + 7$. Compute $f^{-1}(x) = cx + d$. How much is $2c + 3d$?
A) $-\frac{17}{3}$, B) $-\frac{14}{3}$, C) $-\frac{19}{3}$, D) $-\frac{16}{3}$, E) $-\frac{20}{3}$

(6) One of the eigenvectors of the matrix $\begin{pmatrix} 2 & 6 \\ 6 & 2 \end{pmatrix}$ is $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$. What is the correspondig eigenvalue?
A) 4, B) 8, C) 5, D) 7, E) 6

1^1: 2^1: 3^1: 4^1: 5^1: 6^1:

(1) One of the eigenvectors of the matrix $\begin{pmatrix} 4 & 6 \\ 6 & 4 \end{pmatrix}$ is $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$. What is the corresponding eigenvalue?
A) 0, B) -1, C) -2, D) -3, E) 1

(2) Compute $\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 4 & 0 \\ 1 & 1 \end{pmatrix}^{-1}$. How much is $a + 2b + 3c + 4d$?
A) $\frac{1}{2}$, B) $\frac{3}{2}$, C) $\frac{9}{2}$, D) $\frac{7}{2}$, E) $\frac{5}{2}$

(3) Let us take the following mapping $\phi : \begin{pmatrix} x \\ y \end{pmatrix} \to \begin{pmatrix} 4 & z \\ 4 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$. How much is z, if ϕ is not invertible?
A) 2, B) 3, C) 4, D) 1, E) 0

(4) Let $f(x) = 3x + 5$. Compute $f^{-1}(x) = cx + d$. How much is $2c + 3d$?
A) $-\frac{16}{3}$, B) $-\frac{11}{3}$, C) $-\frac{17}{3}$, D) $-\frac{13}{3}$, E) $-\frac{14}{3}$

(5) Let $f(x) = 2x - 3$ and $x_0 = 6$. Compute $f^9(x_0)$.
A) 1538, B) 1542, C) 1540, D) 1539, E) 1541

(6) One of the eigenvalues of the matrix $\begin{pmatrix} 1 & 3 \\ 0 & 5 \end{pmatrix}$ is 5. Compute the correspondig eigenvector $\begin{pmatrix} x \\ y \end{pmatrix}$. How much is x/y ?
A) -6, B) -3, C) -5, D) -4, E) -7

$_1$1: $_2$1: $_3$1: $_4$1: $_5$1: $_6$1:

(1) Let $f(x) = 2x + 3$. Compute $f^{-1}(x) = cx + d$. How much is $2c + 3d$?
A) $\frac{1}{2}$, B) $-\frac{3}{2}$, C) $-\frac{1}{2}$, D) $-\frac{5}{2}$, E) $-\frac{7}{2}$

(2) Compute $\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 3 & 0 \\ 4 & 4 \end{pmatrix}^{-1}$. How much is $a + 2b + 3c + 4d$?
A) $\frac{4}{3}$, B) $-\frac{1}{3}$, C) $\frac{1}{3}$, D) $\frac{2}{3}$, E) $\frac{5}{3}$

(3) Let $f(x) = 2x - 2$ and $x_0 = 4$. Compute $f^{10}(x_0)$.
A) 2047, B) 2050, C) 2049, D) 2048, E) 2051

(4) One of the eigenvectors of the matrix $\begin{pmatrix} 1 & 5 \\ 5 & 1 \end{pmatrix}$ is $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$. What is the corresponding eigenvalue?
A) -4, B) -1, C) 0, D) -3, E) -2

(5) Let us take the following mapping $\phi : \begin{pmatrix} x \\ y \end{pmatrix} \to \begin{pmatrix} 2 & 2 \\ 4 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$. How much is the signed area of the image of the unit square?
A) -2, B) -3, C) -1, D) -4, E) 0

(6) Suppose that the dynamics of a two state stochastic system is generated by the matrix $\begin{pmatrix} \frac{1}{2} & \frac{3}{5} \\ \frac{1}{2} & \frac{2}{5} \end{pmatrix}$. Find the steady state probability vector $\begin{pmatrix} p_1 \\ p_2 \end{pmatrix}$. How much is p_1/p_2 ?
A) $\frac{7}{5}$, B) $\frac{11}{5}$, C) $\frac{9}{5}$, D) $\frac{6}{5}$, E) $\frac{8}{5}$

$_1$1: $_2$1: $_3$1: $_4$1: $_5$1: $_6$1:

1	1: D^1, 2: D^1, 3: A^1, 4: E^1, 5: B^1, 6: B^1,
2	1: E^1, 2: E^1, 3: C^1, 4: C^1, 5: D^1, 6: E^1,
3	1: C^1, 2: D^1, 3: E^1, 4: E^1, 5: D^1, 6: A^1,
4	1: D^1, 2: C^1, 3: D^1, 4: C^1, 5: C^1, 6: B^1,
5	1: C^1, 2: D^1, 3: A^1, 4: D^1, 5: D^1, 6: B^1,
6	1: E^1, 2: C^1, 3: B^1, 4: A^1, 5: E^1, 6: D^1,