

大問1  
数学①

A1,A2	(16)(17)
A3	(12)
A4	(11)
A5,A6	(7)(8)
A7	(3)
A8	(20)
A9,AX	(2)(15)
B1	(19)
B2,B3	(14)(7)
B4,B5	(7)(4)
B6,B7	(12)(5)
B8,B9	(1)(2)
BX	(2)
C1,C2	(18)(19)
C3	(15)
C4	(11)
C5	(10)
C6	(3)
C7	(4)
C8	(1)
C9,CX,D1	(6)(12)(9)
D2,D3,D4	(5)(8)(10)
D5,D6,D7	(7)(8)(11)
D8,D9	(5)(6)
DX,E1	(2)(3)
E2	(7)

大問2  
数学②

A1,A2,A3	(5)(8)(4)
A4,A5	(3)(4)
A6	(5)
A7,A8	(15)(5)
A9	(4)
AX,B1	(5)(4)
B2	(1)
B3,B4	(15)(14)
B5,B6	(11)(16)
B7,B8	(8)(12)
B9	(8)
BX	(2)
C1,C2,C3	(17)(12)(15)
C4	(5)
C5,C6,C7	(2)(10)(8)
C8	(8)
C9,CX	(12)(2)
D1,D2	(6)(7) or(7)(9)
D3	(16)
D4	(1)
D5	(18)
D6	(18)
D7	(4)
D8,D9,DX	(10)(13)(20)
E1,E2	(5)(6)
E3	(15)
E4	(12)
E5,E6	(3)(9)

大問3  
数学③

A1,A2,A3	(8)(13)(14)
A4,A5,A6	(1)(4)(2)
A7,A8,A9	(13)(8)(14)
AX,B1	(18)(20)
B2,B3	(16)(15)
B4	(2)
B5,B6	(11)(3)
B7	(1)
B8,B9	(7)(6)
BX	(2)
C1	(2)
C2	(2)
C3,C4	(1)(8)
C5,C6	(7)(7)
C7	(1)
C8	(7)
C9	(4)
CX	(9)
D1,D2	(16)(13)
D3,D4	(3)(5)
D5	(13)
D6,D7	(2)(10)
D8,D9	(6)(6)
DX,E1	(11)(2)
E2,E3	(4)(7)
E4,E5	(2)(4)

大問4  
物理学①

A1	(4)
A2	(1)
A3	(8)
A4	(12)
A5	(14)
A6	(1)
A7	(8)
A8	(2)
A9	(3)
AX	(1)
B1	(4)
B2	(5)
B3	(7)
B4	(3)
B5	(10)
B6	(20)
B7	(2)

大問5  
物理学②

A1	(2)
A2	(4)
A3	(11)
A4	(15)
A5	(16)
A6	(6)
A7	(3)
A8	(19)
A9	(20)
AX	(18)
B1	(10)
B2	(2)
B3	(9)
B4	(10)
B5	(6)
B6	(6)
B7	(8)
B8	(8)
B9	(2)

大問6  
化学①

A1	(7)
A2	(2)
A3	(3)
A4	(4)
A5	(4)
A6	(2)
A7	(5)
A8	(2)
A9	(4)
AX	(3)
B1	(1)
B2	(8)
B3	(8)
B4	(9)
B5	(5)
B6	(2)
B7	(8)
B8	(4)
B9	(4)
BX	(3)
C1	(3)
C2	(3)
C3	(4)
C4	(2)
C5	(2)
C6	(2)
C7	(2)
C8	(4)

大問7  
化学②

A1	(1)
A2	(4)
A3	(2)
A4	(1)
A5	(4)
A6	(3)
A7	(3)
A8	(3)
A9	(1)
AX	(3)
B1	(3)
B2	(2)
B3	(5)
B4	(3)
B5	(4)
B6	(3)
B7	(1)
B8	(2)
B9	(4)
BX	(2)
C1	(3)
C2	(1)
C3	(3)

大問8  
化学③

A1	(3)
A2	(2)
A3	(3)
A4	(3)
A5	(1)
A6	(1)
A7	(2)
A8	(2)
A9	(1)
AX	(2)
B1	(2)
B2	(2)
B3	(2)
B4	(1)
B5	(1)
B6	(3)
B7	(2)
B8	(2)
B9	(2)
BX	(1)
C1	(3)
C2	(2)
C3	(3)

記述式 正解例 (例なので全く同じである必要はありません)

大問 1 (数学①)

問 2(1)

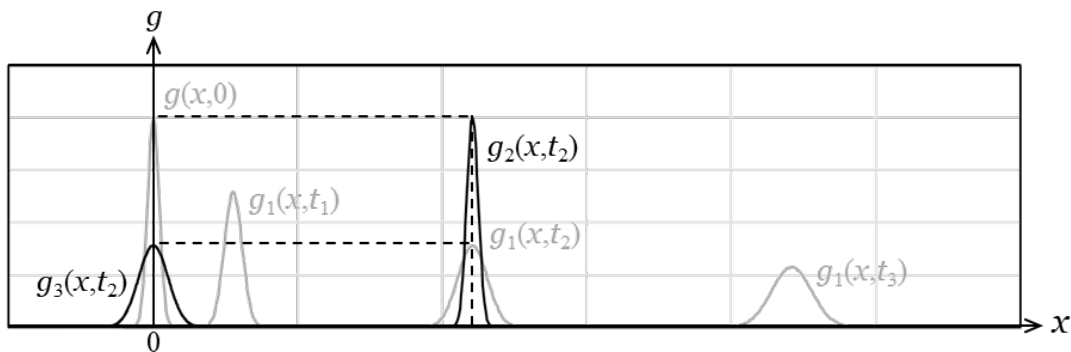
$$m = us \text{ より, } \frac{\partial m}{\partial x} = \frac{\partial u}{\partial x} s + u \frac{\partial s}{\partial x}$$

$$\text{よって, } \frac{\partial^2 m}{\partial x^2} = \frac{\partial^2 u}{\partial x^2} s + 2 \frac{\partial u}{\partial x} \frac{\partial s}{\partial x} + u \frac{\partial^2 s}{\partial x^2}$$

問 2(2)

$$\int_0^\infty \int_0^{2\pi} e^{-r^2} r d\theta dr = 2\pi \left[ -\frac{1}{2} e^{-r^2} \right]_0^\infty = \pi$$

問 4

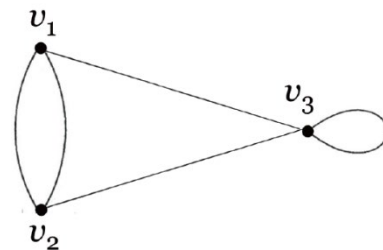


大問2 (数学②)

問2(1)

$$|A|=5, \tilde{A} = \begin{bmatrix} \left[ \begin{array}{cc|cc} -1 & 1 & 0 & 3 \\ -2 & 0 & -2 & 0 \end{array} \right] & \left[ \begin{array}{cc|cc} 0 & 3 & 0 & 3 \\ -1 & 1 & 1 & 3 \\ 1 & 0 & 0 & 1 \end{array} \right] \\ \left[ \begin{array}{cc|cc} 0 & -1 & 1 & 0 \\ 1 & -2 & 1 & -2 \end{array} \right] & \left[ \begin{array}{cc|cc} 1 & 0 & 1 & 0 \\ 0 & -1 & 0 & -1 \end{array} \right] \end{bmatrix} = \begin{bmatrix} 2 & -6 & 3 \\ 1 & -3 & -1 \\ 1 & 2 & -1 \end{bmatrix}$$

問3(2)



問3(3)

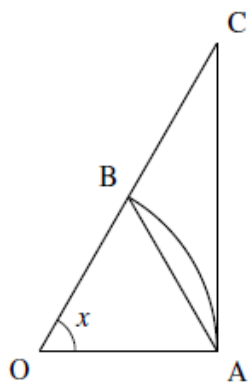
$$|\lambda I - H| = \begin{vmatrix} \lambda & -2 & -1 \\ -2 & \lambda & -1 \\ -1 & -1 & \lambda - 1 \end{vmatrix} = \lambda(\lambda + 2)(\lambda - 3) = 0 \quad \text{よって, 固有値 } \lambda = -2, 0, 3$$

固有値  $\lambda$  に対して  $(\lambda I - H)\mathbf{u} = \begin{bmatrix} \lambda & -2 & -1 \\ -2 & \lambda & -1 \\ -1 & -1 & \lambda - 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$  を満たすのが固有ベクトル  $\mathbf{u}$  である.

任意の  $t (\neq 0)$  を用いて,  $\lambda = -2$  のとき  $\mathbf{u} = t \begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$ ,  $\lambda = 0$  のとき  $\mathbf{u} = t \begin{bmatrix} 1 \\ 1 \\ -2 \end{bmatrix}$ ,  $\lambda = 3$  のとき  $\mathbf{u} = t \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ .

大問3 (数学③)

問1(1)



問3(2)iii

