

代数学幾何学 (A/B) 計算演習 [問題] (2009/05/21)

問. 次の空間ベクトル v への射影子行列を求めなさい

Q.1

$$v = \begin{pmatrix} 6 \\ 3 \\ -4 \end{pmatrix}$$

Q.8

$$v = \begin{pmatrix} 0 \\ 2 \\ 4 \end{pmatrix}$$

Q.15

$$v = \begin{pmatrix} -3 \\ 3 \\ -2 \end{pmatrix}$$

Q.2

$$v = \begin{pmatrix} -3 \\ 7 \\ 0 \end{pmatrix}$$

Q.9

$$v = \begin{pmatrix} 3 \\ -5 \\ 5 \end{pmatrix}$$

Q.16

$$v = \begin{pmatrix} 7 \\ 5 \\ -1 \end{pmatrix}$$

Q.3

$$v = \begin{pmatrix} -5 \\ -6 \\ 0 \end{pmatrix}$$

Q.10

$$v = \begin{pmatrix} 2 \\ 7 \\ 3 \end{pmatrix}$$

Q.17

$$v = \begin{pmatrix} -6 \\ 0 \\ 3 \end{pmatrix}$$

Q.4

$$v = \begin{pmatrix} -6 \\ 6 \\ 1 \end{pmatrix}$$

Q.11

$$v = \begin{pmatrix} 1 \\ 6 \\ 4 \end{pmatrix}$$

Q.18

$$v = \begin{pmatrix} -2 \\ 1 \\ -2 \end{pmatrix}$$

Q.5

$$v = \begin{pmatrix} -6 \\ -1 \\ 2 \end{pmatrix}$$

Q.12

$$v = \begin{pmatrix} -6 \\ 5 \\ 6 \end{pmatrix}$$

Q.19

$$v = \begin{pmatrix} 0 \\ -3 \\ -6 \end{pmatrix}$$

Q.6

$$v = \begin{pmatrix} -4 \\ 7 \\ -5 \end{pmatrix}$$

Q.13

$$v = \begin{pmatrix} 1 \\ -5 \\ 3 \end{pmatrix}$$

Q.20

$$v = \begin{pmatrix} 6 \\ 0 \\ 3 \end{pmatrix}$$

Q.7

$$v = \begin{pmatrix} -6 \\ -6 \\ 0 \end{pmatrix}$$

Q.14

$$v = \begin{pmatrix} 1 \\ 5 \\ 3 \end{pmatrix}$$

Q.21

$$v = \begin{pmatrix} -1 \\ 0 \\ 7 \end{pmatrix}$$

代数学幾何学 (A/B) 計算演習 [解答] (2009/05/21)

A.1

$$\begin{pmatrix} \frac{36}{61} & \frac{18}{61} & -\frac{24}{61} \\ \frac{18}{61} & \frac{9}{61} & -\frac{12}{61} \\ -\frac{24}{61} & -\frac{12}{61} & \frac{16}{61} \end{pmatrix}$$

A.8

$$\begin{pmatrix} 0 & 0 & 0 \\ 0 & \frac{1}{5} & \frac{2}{5} \\ 0 & \frac{2}{5} & \frac{4}{5} \end{pmatrix}$$

A.15

$$\begin{pmatrix} \frac{9}{22} & -\frac{9}{22} & \frac{3}{11} \\ -\frac{9}{22} & \frac{9}{22} & -\frac{3}{11} \\ \frac{3}{11} & -\frac{3}{11} & \frac{2}{11} \end{pmatrix}$$

A.2

$$\begin{pmatrix} \frac{9}{58} & -\frac{21}{58} & 0 \\ -\frac{21}{58} & \frac{49}{58} & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

A.9

$$\begin{pmatrix} \frac{9}{59} & -\frac{15}{59} & \frac{15}{59} \\ -\frac{15}{59} & \frac{25}{59} & -\frac{25}{59} \\ \frac{15}{59} & -\frac{25}{59} & \frac{25}{59} \end{pmatrix}$$

A.16

$$\begin{pmatrix} \frac{49}{75} & \frac{7}{15} & -\frac{7}{75} \\ \frac{7}{15} & \frac{1}{3} & -\frac{1}{15} \\ -\frac{7}{75} & -\frac{1}{15} & \frac{1}{75} \end{pmatrix}$$

A.3

$$\begin{pmatrix} \frac{25}{61} & \frac{30}{61} & 0 \\ \frac{30}{61} & \frac{36}{61} & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

A.10

$$\begin{pmatrix} \frac{2}{31} & \frac{7}{31} & \frac{3}{31} \\ \frac{7}{31} & \frac{49}{62} & \frac{21}{62} \\ \frac{3}{31} & \frac{21}{62} & \frac{9}{62} \end{pmatrix}$$

A.17

$$\begin{pmatrix} \frac{4}{5} & 0 & -\frac{2}{5} \\ 0 & 0 & 0 \\ -\frac{2}{5} & 0 & \frac{1}{5} \end{pmatrix}$$

A.4

$$\begin{pmatrix} \frac{36}{73} & -\frac{36}{73} & -\frac{6}{73} \\ -\frac{36}{73} & \frac{36}{73} & \frac{6}{73} \\ -\frac{6}{73} & \frac{6}{73} & \frac{1}{73} \end{pmatrix}$$

A.11

$$\begin{pmatrix} \frac{1}{53} & \frac{6}{53} & \frac{4}{53} \\ \frac{6}{53} & \frac{36}{53} & \frac{24}{53} \\ \frac{4}{53} & \frac{24}{53} & \frac{16}{53} \end{pmatrix}$$

A.18

$$\begin{pmatrix} \frac{4}{9} & -\frac{2}{9} & \frac{4}{9} \\ -\frac{2}{9} & \frac{1}{9} & -\frac{2}{9} \\ \frac{4}{9} & -\frac{2}{9} & \frac{4}{9} \end{pmatrix}$$

A.5

$$\begin{pmatrix} \frac{36}{41} & \frac{6}{41} & -\frac{12}{41} \\ \frac{6}{41} & \frac{1}{41} & -\frac{2}{41} \\ -\frac{12}{41} & -\frac{2}{41} & \frac{4}{41} \end{pmatrix}$$

A.12

$$\begin{pmatrix} \frac{36}{97} & -\frac{30}{97} & -\frac{36}{97} \\ -\frac{30}{97} & \frac{25}{97} & \frac{30}{97} \\ -\frac{36}{97} & \frac{30}{97} & \frac{36}{97} \end{pmatrix}$$

A.19

$$\begin{pmatrix} 0 & 0 & 0 \\ 0 & \frac{1}{5} & \frac{2}{5} \\ 0 & \frac{2}{5} & \frac{4}{5} \end{pmatrix}$$

A.6

$$\begin{pmatrix} \frac{8}{45} & -\frac{14}{45} & \frac{2}{9} \\ -\frac{14}{45} & \frac{49}{90} & -\frac{7}{18} \\ \frac{2}{9} & -\frac{7}{18} & \frac{5}{18} \end{pmatrix}$$

A.13

$$\begin{pmatrix} \frac{1}{35} & -\frac{1}{7} & \frac{3}{35} \\ -\frac{1}{7} & \frac{5}{7} & -\frac{3}{7} \\ \frac{3}{35} & -\frac{3}{7} & \frac{9}{35} \end{pmatrix}$$

A.20

$$\begin{pmatrix} \frac{4}{5} & 0 & \frac{2}{5} \\ 0 & 0 & 0 \\ \frac{2}{5} & 0 & \frac{1}{5} \end{pmatrix}$$

A.7

$$\begin{pmatrix} \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

A.14

$$\begin{pmatrix} \frac{1}{35} & \frac{1}{7} & \frac{3}{35} \\ \frac{1}{7} & \frac{5}{7} & \frac{3}{7} \\ \frac{3}{35} & \frac{3}{7} & \frac{9}{35} \end{pmatrix}$$

A.21

$$\begin{pmatrix} \frac{1}{50} & 0 & -\frac{7}{50} \\ 0 & 0 & 0 \\ -\frac{7}{50} & 0 & \frac{49}{50} \end{pmatrix}$$