

代数学幾何学 (A/B) 計算演習 [問題] (2009/06/04)

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

$$v = \begin{pmatrix} -5 \\ -4 \\ -6 \end{pmatrix}$$

Q.8

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

Q.15

$$v = \begin{pmatrix} -1 \\ 3 \\ -6 \end{pmatrix}$$

Q.2

$$v = \begin{pmatrix} -4 \\ -3 \\ -2 \end{pmatrix}$$

Q.9

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

Q.16

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

Q.3

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

Q.10

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

Q.17

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

Q.4

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

Q.11

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

Q.18

$$v = \begin{pmatrix} -2 \\ 7 \\ 6 \end{pmatrix}$$

Q.5

$$v = \begin{pmatrix} -2 \\ -4 \\ -5 \end{pmatrix}$$

Q.12

$$v = \begin{pmatrix} 3 \\ -2 \\ -5 \end{pmatrix}$$

Q.19

$$v = \begin{pmatrix} 5 \\ 1 \\ 4 \end{pmatrix}$$

Q.6

$$v = \begin{pmatrix} -2 \\ -1 \\ 4 \end{pmatrix}$$

Q.13

$$v = \begin{pmatrix} -1 \\ -3 \\ -4 \end{pmatrix}$$

Q.20

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

Q.7

$$v = \begin{pmatrix} -1 \\ 3 \\ 7 \end{pmatrix}$$

Q.14

$$v = \begin{pmatrix} 4 \\ -2 \\ -1 \end{pmatrix}$$

Q.21

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

代数学幾何学 (A/B) 計算演習 [解答] (2009/06/04)

A.1

$$\begin{pmatrix} \frac{25}{77} & \frac{20}{77} & \frac{30}{77} \\ \frac{20}{77} & \frac{16}{77} & \frac{24}{77} \\ \frac{30}{77} & \frac{24}{77} & \frac{36}{77} \end{pmatrix}$$

A.8

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

A.15

$$\begin{pmatrix} \frac{1}{46} & -\frac{3}{46} & \frac{3}{23} \\ -\frac{3}{46} & \frac{9}{46} & -\frac{9}{23} \\ \frac{3}{23} & -\frac{9}{23} & \frac{18}{23} \end{pmatrix}$$

A.2

$$\begin{pmatrix} \frac{16}{29} & \frac{12}{29} & \frac{8}{29} \\ \frac{12}{29} & \frac{9}{29} & \frac{6}{29} \\ \frac{8}{29} & \frac{6}{29} & \frac{4}{29} \end{pmatrix}$$

A.9

$$\begin{pmatrix} \frac{9}{11} & \frac{3}{11} & \frac{3}{11} \\ \frac{3}{11} & \frac{1}{11} & \frac{1}{11} \\ \frac{3}{11} & \frac{1}{11} & \frac{1}{11} \end{pmatrix}$$

A.16

$$\begin{pmatrix} \frac{9}{11} & -\frac{3}{11} & \frac{3}{11} \\ -\frac{3}{11} & \frac{1}{11} & -\frac{1}{11} \\ \frac{3}{11} & -\frac{1}{11} & \frac{1}{11} \end{pmatrix}$$

A.3

$$\begin{pmatrix} \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \\ \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \\ \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \end{pmatrix}$$

A.10

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

A.17

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

A.4

$$\begin{pmatrix} \frac{1}{6} & -\frac{1}{6} & -\frac{1}{3} \\ -\frac{1}{6} & \frac{1}{6} & \frac{1}{3} \\ -\frac{1}{3} & \frac{1}{3} & \frac{2}{3} \end{pmatrix}$$

A.11

$$\begin{pmatrix} \frac{49}{51} & -\frac{7}{51} & \frac{7}{51} \\ -\frac{7}{51} & \frac{1}{51} & -\frac{1}{51} \\ \frac{7}{51} & -\frac{1}{51} & \frac{1}{51} \end{pmatrix}$$

A.18

$$\begin{pmatrix} \frac{4}{89} & -\frac{14}{89} & -\frac{12}{89} \\ -\frac{14}{89} & \frac{49}{89} & \frac{42}{89} \\ -\frac{12}{89} & \frac{42}{89} & \frac{36}{89} \end{pmatrix}$$

A.5

$$\begin{pmatrix} \frac{4}{45} & \frac{8}{45} & \frac{2}{9} \\ \frac{8}{45} & \frac{16}{45} & \frac{4}{9} \\ \frac{2}{9} & \frac{4}{9} & \frac{5}{9} \end{pmatrix}$$

A.12

$$\begin{pmatrix} \frac{9}{38} & -\frac{3}{19} & -\frac{15}{38} \\ -\frac{3}{19} & \frac{2}{19} & \frac{5}{19} \\ -\frac{15}{38} & \frac{5}{19} & \frac{25}{38} \end{pmatrix}$$

A.19

$$\begin{pmatrix} \frac{25}{42} & \frac{5}{42} & \frac{10}{21} \\ \frac{5}{42} & \frac{1}{42} & \frac{2}{21} \\ \frac{10}{21} & \frac{2}{21} & \frac{8}{21} \end{pmatrix}$$

A.6

$$\begin{pmatrix} \frac{4}{21} & \frac{2}{21} & -\frac{8}{21} \\ \frac{2}{21} & \frac{1}{21} & -\frac{4}{21} \\ -\frac{8}{21} & -\frac{4}{21} & \frac{16}{21} \end{pmatrix}$$

A.13

$$\begin{pmatrix} \frac{1}{26} & \frac{3}{26} & \frac{2}{13} \\ \frac{3}{26} & \frac{9}{26} & \frac{6}{13} \\ \frac{2}{13} & \frac{6}{13} & \frac{8}{13} \end{pmatrix}$$

A.20

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

A.7

$$\begin{pmatrix} \frac{1}{59} & -\frac{3}{59} & -\frac{7}{59} \\ -\frac{3}{59} & \frac{9}{59} & \frac{21}{59} \\ -\frac{7}{59} & \frac{21}{59} & \frac{49}{59} \end{pmatrix}$$

A.14

$$\begin{pmatrix} \frac{16}{21} & -\frac{8}{21} & -\frac{4}{21} \\ -\frac{8}{21} & \frac{4}{21} & \frac{2}{21} \\ -\frac{4}{21} & \frac{2}{21} & \frac{1}{21} \end{pmatrix}$$

A.21

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