

Problems 10–14 are about special vectors on cubes and clocks in Figure 1.4.

- 10** Which point of the cube is $i + j$? Which point is the vector sum of $i = (1, 0, 0)$ and $j = (0, 1, 0)$ and $k = (0, 0, 1)$? Describe all points (x, y, z) in the cube.
- 11** Four corners of this unit cube are $(0, 0, 0)$, $(1, 0, 0)$, $(0, 1, 0)$, $(0, 0, 1)$. What are the other four corners? Find the coordinates of the center point of the cube. The center points of the six faces are _____. The cube has how many edges?
- 12** *Review Question.* In xyz space, where is the plane of all linear combinations of $i = (1, 0, 0)$ and $i + j = (1, 1, 0)$?

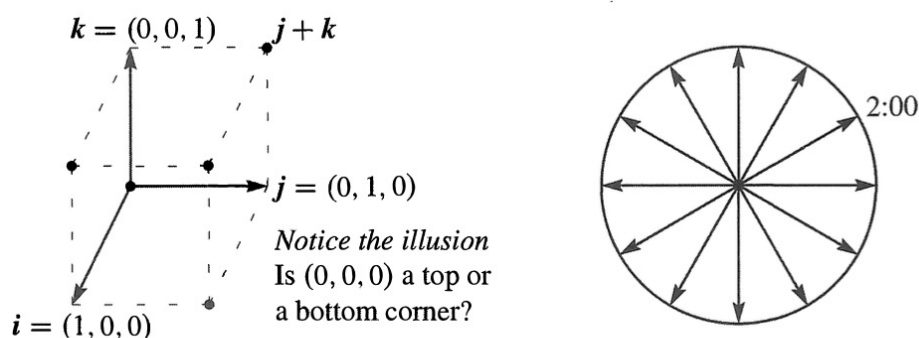


Figure 1.4: Unit cube from i, j, k and twelve clock vectors.

- 13** (a) What is the sum V of the twelve vectors that go from the center of a clock to the hours 1:00, 2:00, ..., 12:00?
 (b) If the 2:00 vector is removed, why do the 11 remaining vectors add to 8:00?
 (c) What are the x, y components of that 2:00 vector $v = (\cos \theta, \sin \theta)$?
- 14** Suppose the twelve vectors start from 6:00 at the bottom instead of $(0, 0)$ at the center. The vector to 12:00 is doubled to $(0, 2)$. The new twelve vectors add to _____.

Problems 15–19 go further with linear combinations of v and w (Figure 1.5a).

- 15** Figure 1.5a shows $\frac{1}{2}v + \frac{1}{2}w$. Mark the points $\frac{3}{4}v + \frac{1}{4}w$ and $\frac{1}{4}v + \frac{1}{4}w$ and $v + w$.
- 16** Mark the point $-v + 2w$ and any other combination $cv + dw$ with $c + d = 1$. Draw the line of all combinations that have $c + d = 1$.
- 17** Locate $\frac{1}{3}v + \frac{1}{3}w$ and $\frac{2}{3}v + \frac{2}{3}w$. The combinations $cv + cw$ fill out what line?
- 18** Restricted by $0 \leq c \leq 1$ and $0 \leq d \leq 1$, shade in all combinations $cv + dw$.
- 19** Restricted only by $c \geq 0$ and $d \geq 0$ draw the “cone” of all combinations $cv + dw$.

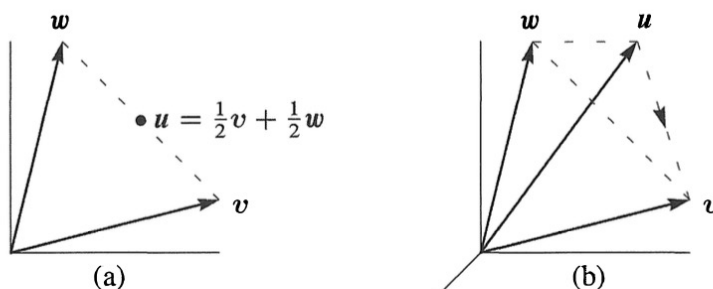


Figure 1.5: Problems 15–19 in a plane

Problems 20–25 in 3-dimensional space

Problems 20–25 deal with u, v, w in three-dimensional space (see Figure 1.5b).

- 20** Locate $\frac{1}{3}u + \frac{1}{3}v + \frac{1}{3}w$ and $\frac{1}{2}u + \frac{1}{2}w$ in Figure 1.5b. Challenge problem: Under what restrictions on c, d, e , will the combinations $cu + dv + ew$ fill in the dashed triangle? To stay in the triangle, one requirement is $c \geq 0, d \geq 0, e \geq 0$.
- 21** The three sides of the dashed triangle are $v - u$ and $w - v$ and $u - w$. Their sum is _____. Draw the head-to-tail addition around a plane triangle of $(3, 1)$ plus $(-1, 1)$ plus $(-2, -2)$.
- 22** Shade in the pyramid of combinations $cu + dv + ew$ with $c \geq 0, d \geq 0, e \geq 0$ and $c + d + e \leq 1$. Mark the vector $\frac{1}{2}(u + v + w)$ as inside or outside this pyramid.
- 23** If you look at *all* combinations of those u, v , and w , is there any vector that can't be produced from $cu + dv + ew$? Different answer if u, v, w are all in _____.
- 24** Which vectors are combinations of u and v , and *also* combinations of v and w ?
- 25** Draw vectors u, v, w so that their combinations $cu + dv + ew$ fill only a line. Find vectors u, v, w so that their combinations $cu + dv + ew$ fill only a plane.
- 26** What combination $c \begin{bmatrix} 1 \\ 2 \end{bmatrix} + d \begin{bmatrix} 3 \\ 1 \end{bmatrix}$ produces $\begin{bmatrix} 14 \\ 8 \end{bmatrix}$? Express this question as two equations for the coefficients c and d in the linear combination.

第二次作业

1.2: 17–29;

1.3: 3, 6–13;

2.1: 5–8; 17–22;

2.2: 11, 18, 20;

2.3: 1, 2, 3, 7, 9, 12, 17, 18, 19, 22, 23, 25–28

第三次作业

2.4: 7, 9, 15, 21–24; 32–34

2.5: 3, 7, 9, 21, 23, 29, 30, 32, 34

2.6: 5, 7, 13, 16, 19

2.7: 4, 5, 6, 7, 9, 11–15, 17, 18, 19, 24, 32, 34, 35

第四次作业

Book: Linear Algebra Done Right

2A: 1, 5, 9, 10, 12, 14, 15, 16, 17

第五次作业

2B: 3, 4, 5, 7, 8;

2C: 1, 3, 8, 9, 10;

第六次作业

2C:12,14,15,16,17;

第七次作业

4.1: 3, 4, 7, 10, 13, 16,23-26;

4.2: 13, 17,19,23;

第八次作业

5.1: 1-5, 7,8,11,13,15,17,18,27,28,29,30;

5.2: 4,7,9,10,12,15-19,23,25,26;

5.3: 1,4-7, 9,10,14,20,25-29,34

第九次作业

6.1: 2,4,5,6,8,9,11,13,16,19,20,21,25,27,28;

第十次作业

6.2: 1,3,4,8,9,11,12,15,16,23,26,30,31,32,39;

6.4: 2,3,7,8, 10,12, 14,16,17, 18,20,23, 4,25;

第十一次作业

6.5: 4,5,6,8,9,10,12,15,16,18,21,24,26,31;

第十二次作业

7.1:1-4, 7;

7.2:4,6,10,11,13,16,18,19,23-27

第十三次作业

7.4: 4,7,11,13,16,17,19-22;