You can find here the solutions to the problems whose solution is not on the back of the book.

Problem 1.1.15

Solution:
The point $\frac{3}{4}v + \frac{1}{4}w$ is three-fourths of the way to $v$ starting from $w$.
The point $\frac{1}{4}v + \frac{1}{4}w$ is halfway to $u = \frac{1}{2}v + \frac{1}{2}w$.
The point $v + w$ is equal to $2u$, which is the far corner of the parallelogram.

Problem 1.1.18

Solution:
The linear combinations $cv + dw$, for the real numbers $0 \leq c \leq 1$ and $0 \leq d \leq 1$ fill the parallelogram with sides $v$ and $w$. For example, if $v = (1, 0)$ and $w = (0, 1)$ then the linear combinations $cv + dw$ fill the unit square.

Problem 1.1.19

Solution:
With $c \geq 0$ and $d \geq 0$ we get the infinite cone between $v$ and $w$. For example, if $v = (1, 0)$ and $w = (0, 1)$, the cone is the whole first quadrant, i.e., $\{(x, y) \in \mathbb{R}^2 : x \geq 0, y \geq 0\}$.

Problem 1.1.29

Solution:
Many of you had trouble finding the linear combinations of $v$, $u$ and $w$ that give $b = (0, 1)$. Rather than using the method of row reduction on the matrix of coefficients, it sufficed to notice that $-2u + v = b$ and $\frac{1}{2}w - \frac{1}{2}v = b$. The answer to the question that Strang poses is NO, since three vectors $v$, $u$ and $w$ in the $xy$ plane could fail to produce $b$ if all three lie on a line that does not contain $b$. 
Problem 1.2.8

Solution:

1. False, because \( \mathbf{v} \) and \( \mathbf{w} \) are any vectors in the plane which are perpendicular to \( \mathbf{u} \).

2. True, since \( \mathbf{u} \cdot (\mathbf{v} + 2\mathbf{w}) = \mathbf{u} \cdot \mathbf{v} + 2\mathbf{u} \cdot \mathbf{w} = 0 \).

3. True, since \( \|\mathbf{u} - \mathbf{v}\|^2 = (\mathbf{u} - \mathbf{v}) \cdot (\mathbf{u} - \mathbf{v}) = \mathbf{u} \cdot \mathbf{u} + 2\mathbf{u} \cdot \mathbf{v} + \mathbf{v} \cdot \mathbf{v} \) becomes \( \mathbf{u} \cdot \mathbf{u} + \mathbf{v} \cdot \mathbf{v} = 2 \) when \( \mathbf{u} \cdot \mathbf{v} = 0 \).

Problem 1.2.27

Solution:
By the triangle inequality, we know that \( \|\mathbf{v}\| - \|\mathbf{w}\| \leq \|\mathbf{v} - \mathbf{w}\| \leq \|\mathbf{v}\| + \|\mathbf{w}\| \). Also, computing the lengths of \( \mathbf{v} \) and \( \mathbf{w} \) we get \( \|\mathbf{v}\| = 5 \) and \( \|\mathbf{w}\| = 3 \). Hence, \( 2 \leq \|\mathbf{v} - \mathbf{w}\| \leq 8 \). Hence, by the Cauchy-Schwarz inequality, the dot product \( \mathbf{v} \cdot \mathbf{w} \) is between -15 and 15. Most of you got this computation right. Those who didn’t got it wrong because they don’t understand that lengths are not the same as absolute values. Go back and read the definition of the length of a vector again!