

Homework Set 2 (Revised)

Read sections 1.2, 2.1.

Section 1.2

1. (BH) page 27, exercise 56
2. (BH) page 27, exercise 64
3.
 - (a) (BH) Find c so that the vectors

$$\begin{pmatrix} 2 \\ c \end{pmatrix} \text{ and } \begin{pmatrix} -3 \\ 5 \end{pmatrix}$$

are parallel.

- (b) (MP) Calculate the angle between the two vectors for any c .
4. (BH) Let

$$\mathbf{v} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}, \quad \mathbf{w} = \begin{pmatrix} 4 \\ 6 \end{pmatrix}.$$

- (a) Find $\text{proj}_{\mathbf{w}} \mathbf{v}$.
 - (b) Find the vector component of \mathbf{v} orthogonal to \mathbf{w} .
5. (MP) Let $\mathbf{v} = (2, -3, 1, 0, 5)$, $\mathbf{w} = (-4, 2, 1, 6, -4)$.
 - (a) Find $\text{proj}_{\mathbf{w}} \mathbf{v}$.
 - (b) Find the vector component of \mathbf{v} orthogonal to \mathbf{w} .

Section 2.1

6. (BH) Consider the following system:

$$x - 2y = -6, \tag{2.1a}$$

$$-2x + 3y = 7. \tag{2.1b}$$

- (a) Determine geometrically whether (2.1) has a unique solution, infinitely many solutions, or no solution.
- (b) Solve (2.1) algebraically.

7. (MP) Consider the following system:

$$(4 + \sqrt{3})x - 2y = 1, \quad (2.2a)$$

$$13x - 2(4 - \sqrt{3})y = 1. \quad (2.2b)$$

- (a) Determine geometrically whether (2.2) has a unique solution, infinitely many solutions, or no solution.
 (b) Solve (2.2) algebraically.

8. (BH)

- (a) Find a system of two linear equations in the variables x_1, x_2, x_3 whose solution set is given by the parametric equations

$$x_1 = t, \quad x_2 = 2 + t, \quad x_3 = 3 - t.$$

- (b) Find another parametric solution to the system in part (a) where the parameter is s and $x_3 = s$.

9. (BH) Consider the following system:

$$2x + 4y = \lambda, \quad (2.3a)$$

$$-x - 2y = 3. \quad (2.3b)$$

For which value(s) of λ will (2.3) have

- (a) more than one solution?
 (b) exactly one solution?
 (c) no solution?

10. (BH) Solve the following system by the method of elimination:

$$x_1 + 4x_2 + 3x_3 = 1, \quad (2.4a)$$

$$2x_1 + 8x_2 + 11x_3 = 7, \quad (2.4b)$$

$$x_1 + 6x_2 + 7x_3 = 3. \quad (2.4c)$$