

# Úlohy

## 1 Vektory

### 1.1 Zapište vektor $\vec{w}$ jako linearní kombinaci vektorů $\vec{u}$ a $\vec{v}$

1.  $\vec{w} = (-6, 4)$ ,  $\vec{u} = (2, -2)$ ,  $\vec{v} = (-2, 4)$
2.  $\vec{w} = (31, 11)$ ,  $\vec{u} = (-5, -1)$ ,  $\vec{v} = (-4, -2)$
3.  $\vec{w} = (-13, 10)$ ,  $\vec{u} = (-4, 5)$ ,  $\vec{v} = (-1, 0)$
4.  $\vec{w} = (-15, 1)$ ,  $\vec{u} = (-3, 0)$ ,  $\vec{v} = (3, -1)$
5.  $\vec{w} = (3, 20)$ ,  $\vec{u} = (1, 5)$ ,  $\vec{v} = (-2, -5)$
6.  $\vec{w} = (0, -16)$ ,  $\vec{u} = (1, 4)$ ,  $\vec{v} = (-1, 0)$
7.  $\vec{w} = (0, 25)$ ,  $\vec{u} = (-5, -2)$ ,  $\vec{v} = (0, -5)$
8.  $\vec{w} = (12, 8)$ ,  $\vec{u} = (3, -3)$ ,  $\vec{v} = (-3, -1)$
9.  $\vec{w} = (1, 19)$ ,  $\vec{u} = (-4, -4)$ ,  $\vec{v} = (-5, 1)$
10.  $\vec{w} = (10, 8)$ ,  $\vec{u} = (-4, -5)$ ,  $\vec{v} = (-1, 1)$

### 1.2 Vypočítejte velikost vektoru $\vec{u}$

1.  $\vec{u} = (5, 3)$
2.  $\vec{u} = (1, -4)$
3.  $\vec{u} = (-3, 3)$
4.  $\vec{u} = (0, -4)$
5.  $\vec{u} = (-3, 5)$
6.  $\vec{u} = (-5, -3)$
7.  $\vec{u} = (-2, 4)$
8.  $\vec{u} = (3, 2)$
9.  $\vec{u} = (-2, 3)$
10.  $\vec{u} = (3, 4)$

### 1.3 Vypočítejte velikost vektoru $\vec{u}$

1.  $\vec{u} = (-3, 3, -2)$
2.  $\vec{u} = (-3, 4, -3)$
3.  $\vec{u} = (4, -2, 3)$
4.  $\vec{u} = (-4, 5, 3)$
5.  $\vec{u} = (-5, 5, -2)$

6.  $\vec{u} = (5, -5, 1)$
7.  $\vec{u} = (3, -5, -5)$
8.  $\vec{u} = (4, 4, -3)$
9.  $\vec{u} = (3, -2, -2)$
10.  $\vec{u} = (-4, -1, 3)$

#### 1.4 Naleznětě úhel mezi vektory $\vec{u}$ a $\vec{v}$ .

1.  $\vec{u} = \left( \frac{3\sqrt{2}}{2}, \frac{3\sqrt{2}}{2} \right), \vec{v} = \left( \frac{3\sqrt{2}}{4} + \frac{3\sqrt{6}}{4}, -\frac{3\sqrt{2}}{4} + \frac{3\sqrt{6}}{4} \right)$
2.  $\vec{u} = (-2, -2\sqrt{3}), \vec{v} = (-\sqrt{6} - \sqrt{2}, -\sqrt{6} + \sqrt{2})$
3.  $\vec{u} = \left( -\frac{\sqrt{3}}{2}, \frac{1}{2} \right), \vec{v} = \left( \frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4}, -\frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4} \right)$
4.  $\vec{u} = (-1, \sqrt{3}), \vec{v} = \left( \frac{\sqrt{2}}{2} + \frac{\sqrt{6}}{2}, -\frac{\sqrt{6}}{2} + \frac{\sqrt{2}}{2} \right)$
5.  $\vec{u} = (4, 0), \vec{v} = (-2, -2\sqrt{3})$
6.  $\vec{u} = (-2, 0), \vec{v} = (\sqrt{2}, \sqrt{2})$
7.  $\vec{u} = (-1, \sqrt{3}), \vec{v} = (1, \sqrt{3})$
8.  $\vec{u} = \left( -\frac{3}{2}, \frac{3\sqrt{3}}{2} \right), \vec{v} = \left( \frac{3}{2}, -\frac{3\sqrt{3}}{2} \right)$
9.  $\vec{u} = \left( -\frac{1}{2}, -\frac{\sqrt{3}}{2} \right), \vec{v} = \left( -\frac{\sqrt{3}}{2}, -\frac{1}{2} \right)$
10.  $\vec{u} = \left( \frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2} \right), \vec{v} = (0, -1)$

## 2 Přímka a její rovnice

#### 2.1 Zapište všechny tvary rovnice přímky p dané body $A$ a $B$ .

1.  $A = [5, -5], B = [0, 0]$
2.  $A = [3, 1], B = [3, -4]$
3.  $A = [2, -3], B = [0, -3]$
4.  $A = [2, -2], B = [2, 5]$
5.  $A = [-1, -5], B = [4, 0]$
6.  $A = [4, -5], B = [-3, 1]$
7.  $A = [5, -3], B = [0, 5]$
8.  $A = [5, 5], B = [1, 3]$
9.  $A = [2, -1], B = [4, -2]$
10.  $A = [-4, 5], B = [4, 4]$

**2.2** Zapište všechny tvary rovnice přímky p dané bodem A a směrovým vektorem  $\vec{u}$ .

1.  $A = [5, 4]$ ,  $\vec{u} = (3, 1)$
2.  $A = [4, 3]$ ,  $\vec{u} = (1, -5)$
3.  $A = [3, 3]$ ,  $\vec{u} = (-2, 2)$
4.  $A = [-5, 5]$ ,  $\vec{u} = (4, 1)$
5.  $A = [3, -3]$ ,  $\vec{u} = (2, -3)$
6.  $A = [-2, -2]$ ,  $\vec{u} = (5, -1)$
7.  $A = [1, 4]$ ,  $\vec{u} = (3, 0)$
8.  $A = [-4, -3]$ ,  $\vec{u} = (4, -5)$
9.  $A = [-2, -3]$ ,  $\vec{u} = (3, -4)$
10.  $A = [0, -1]$ ,  $\vec{u} = (-3, 2)$

**2.3** Zapište všechny tvary rovnice přímky p, která je kolmá na přímku q a prochází bodem A.

1.  $q : 6x + 4y + 10 = 0$ ,  $A = [3, 3]$
2.  $q = \{[4 - 8t, 4]; t \in \mathbb{R}\}$ ,  $A = [1, 0]$
3.  $q = \{[-t - 2, 3 - t]; t \in \mathbb{R}\}$ ,  $A = [-3, 4]$
4.  $q : -8x + 4y + 28 = 0$ ,  $A = [5, -1]$
5.  $q = \{[3t - 4, 2t - 4]; t \in \mathbb{R}\}$ ,  $A = [-2, 3]$
6.  $q : x + 2y - 7 = 0$ ,  $A = [-5, -2]$
7.  $q : -6x + 5y + 5 = 0$ ,  $A = [-1, 4]$
8.  $q : -x - 5y + 20 = 0$ ,  $A = [-5, 0]$
9.  $q = \{[5t - 5, 2 - 7t]; t \in \mathbb{R}\}$ ,  $A = [5, -5]$
10.  $q : 6y - 6 = 0$ ,  $A = [3, 5]$

**2.4** Zapište všechny tvary rovnice přímky p, která s osou x svírá úhel  $\phi$  a osu y protíná v bodě  $[0, q]$ .

1.  $\phi = \frac{\pi}{2}$ ,  $q = -4$
2.  $\phi = \frac{5\pi}{6}$ ,  $q = 2$
3.  $\phi = \frac{2\pi}{3}$ ,  $q = -4$
4.  $\phi = \frac{2\pi}{3}$ ,  $q = 5$
5.  $\phi = \frac{5\pi}{6}$ ,  $q = -4$
6.  $\phi = \pi$ ,  $q = -2$
7.  $\phi = \frac{5\pi}{6}$ ,  $q = -4$

8.  $\phi = \frac{\pi}{3}$ ,  $q = -1$

9.  $\phi = \frac{\pi}{3}$ ,  $q = -4$

10.  $\phi = \pi$ ,  $q = 0$

## 2.5 Vypočítejte odchylku přímek $p$ a $q$

1.  $p : 3x - 5y + 24 = 0$ ,  $q = \{[-5t - 3, 3 - 3t]; t \in \mathbb{R}\}$

2.  $p : -x + y - 5 = 0$ ,  $q = \{[t \left( -\frac{1}{2} + \frac{\sqrt{3}}{2} \right) - 4, t \left( -\frac{\sqrt{3}}{2} - \frac{1}{2} \right) + 1]; t \in \mathbb{R}\}$

3.  $p = \{[2t + 4, 4t]; t \in \mathbb{R}\}$ ,  $q = \{[t(-2 - \sqrt{3}) + 4, t(1 - 2\sqrt{3})]; t \in \mathbb{R}\}$

4.  $p : -4x = 0$ ,  $q = \{[2\sqrt{3}t, 2t - 2]; t \in \mathbb{R}\}$

5.  $p : -x + 3y - 7 = 0$ ,  $q : x \left( -\frac{3}{2} + \frac{\sqrt{3}}{2} \right) + y \left( -\frac{3\sqrt{3}}{2} - \frac{1}{2} \right) - \frac{11}{2} + \frac{7\sqrt{3}}{2} = 0$

6.  $p = \{[5t, 2 - 3t]; t \in \mathbb{R}\}$ ,  $q : 5x - 3y + 6 = 0$

7.  $p : -3x + 2y - 11 = 0$ ,  $q = \{[\frac{\sqrt{2}t}{2} - 3, -\frac{5\sqrt{2}t}{2} + 1]; t \in \mathbb{R}\}$

8.  $p = \{[-5t - 2, -5]; t \in \mathbb{R}\}$ ,  $q = \{[\frac{5\sqrt{2}t}{2} - 2, -\frac{5\sqrt{2}t}{2} - 5]; t \in \mathbb{R}\}$

9.  $p : -4x - 2y - 12 = 0$ ,  $q : -\sqrt{2}x - 3\sqrt{2}y + 7\sqrt{2} = 0$

10.  $p = \{[5t + 3, -2t - 2]; t \in \mathbb{R}\}$ ,  $q : x \left( -1 + \frac{5\sqrt{3}}{2} \right) + y \left( -\frac{5}{2} - \sqrt{3} \right) - \frac{19\sqrt{3}}{2} - 2 = 0$

## 2.6 Zapište rovnici přímky $p$ dané body $A$ a $B$ .

1.  $A = [4, 5, -2]$ ,  $B = [4, 2, -1]$

2.  $A = [5, 0, 2]$ ,  $B = [-5, -2, 3]$

3.  $A = [3, -5, -3]$ ,  $B = [-1, -2, 5]$

4.  $A = [-4, 2, -4]$ ,  $B = [-2, 3, 5]$

5.  $A = [0, -1, -1]$ ,  $B = [3, 5, -2]$

6.  $A = [0, 3, 2]$ ,  $B = [2, -3, -1]$

7.  $A = [4, -5, -4]$ ,  $B = [3, 5, -3]$

8.  $A = [-4, -3, 1]$ ,  $B = [-2, -2, 2]$

9.  $A = [4, -5, -4]$ ,  $B = [0, -5, 5]$

10.  $A = [2, 4, 5]$ ,  $B = [1, -4, -1]$

### 3 Rovina a její rovnice

3.1 Zapište všechny tvary rovnice roviny  $\sigma$  dané body  $A, B$  a  $C$ .

1.  $A = [-2, 0, -5], B = [-2, 5, -4], C = [5, 5, -1]$
2.  $A = [4, 4, 5], B = [1, 2, 3], C = [4, -1, 4]$
3.  $A = [-2, 0, 1], B = [4, 0, 3], C = [2, -5, -4]$
4.  $A = [-2, 5, 4], B = [-5, 3, 0], C = [-4, 3, -3]$
5.  $A = [0, 2, 0], B = [-3, 3, -3], C = [-3, 3, -1]$
6.  $A = [-5, -5, -2], B = [-1, 0, -5], C = [1, 5, -5]$
7.  $A = [0, 1, -5], B = [-2, -4, 3], C = [4, 3, 0]$
8.  $A = [-1, 2, 1], B = [-2, -5, -3], C = [3, 3, 1]$
9.  $A = [1, 2, -3], B = [2, 0, 2], C = [-5, 4, -3]$
10.  $A = [-3, -4, 3], B = [0, 5, 2], C = [-2, -2, -1]$

# Odpovědi

## 1 Vektory

### 1.1 Zapište vektor $\vec{w}$ jako linearní kombinaci vektorů $\vec{u}$ a $\vec{v}$

1.  $(-6, 4) = -4 \cdot (2, -2) - 1 \cdot (-2, 4)$
2.  $(31, 11) = -3 \cdot (-5, -1) - 4 \cdot (-4, -2)$
3.  $(-13, 10) = 2 \cdot (-4, 5) + 5 \cdot (-1, 0)$
4.  $(-15, 1) = 4 \cdot (-3, 0) - 1 \cdot (3, -1)$
5.  $(3, 20) = 5 \cdot (1, 5) + 1 \cdot (-2, -5)$
6.  $(0, -16) = -4 \cdot (1, 4) - 4 \cdot (-1, 0)$
7.  $(0, 25) = 0 \cdot (-5, -2) - 5 \cdot (0, -5)$
8.  $(12, 8) = -1 \cdot (3, -3) - 5 \cdot (-3, -1)$
9.  $(1, 19) = -4 \cdot (-4, -4) + 3 \cdot (-5, 1)$
10.  $(10, 8) = -2 \cdot (-4, -5) - 2 \cdot (-1, 1)$

### 1.2 Vypočítejte velikost vektoru $\vec{u}$

1.  $\sqrt{34}$
2.  $\sqrt{17}$
3.  $3\sqrt{2}$
4. 4
5.  $\sqrt{34}$
6.  $\sqrt{34}$
7.  $2\sqrt{5}$
8.  $\sqrt{13}$
9.  $\sqrt{13}$
10. 5

### 1.3 Vypočítejte velikost vektoru $\vec{u}$

1.  $\sqrt{22}$
2.  $\sqrt{34}$
3.  $\sqrt{29}$
4.  $5\sqrt{2}$
5.  $3\sqrt{6}$

6.  $\sqrt{51}$
7.  $\sqrt{59}$
8.  $\sqrt{41}$
9.  $\sqrt{17}$
10.  $\sqrt{26}$

#### 1.4 Naleznětě úhel mezi vektory $\vec{u}$ a $\vec{v}$ .

1.  $\frac{\pi}{6}$
2.  $\frac{\pi}{4}$
3.  $\frac{3\pi}{4}$
4.  $\frac{3\pi}{4}$
5.  $\frac{2\pi}{3}$
6.  $\frac{3\pi}{4}$
7.  $\frac{\pi}{3}$
8.  $\pi$
9.  $\frac{\pi}{6}$
10.  $\frac{\pi}{4}$

## 2 Přímka a její rovnice

#### 2.1 Zapište všechny tvary rovnice přímky p dané body A a B.

1.  $p = \{[5 - 5t, 5t - 5]; t \in \mathbb{R}\}, p: 5x + 5y = 0$ , úsekový tvar neexistuje,  $p: y = -x$
2.  $p = \{[3, 1 - 5t]; t \in \mathbb{R}\}, p: 15 - 5x = 0, p: \frac{x}{3} = 1$ , směrnicový tvar neexistuje
3.  $p = \{[2 - 2t, -3]; t \in \mathbb{R}\}, p: 2y + 6 = 0, p: -\frac{y}{3} = 1, p: y = -3$
4.  $p = \{[2, 7t - 2]; t \in \mathbb{R}\}, p: 7x - 14 = 0, p: \frac{x}{2} = 1$ , směrnicový tvar neexistuje
5.  $p = \{[5t - 1, 5t - 5]; t \in \mathbb{R}\}, p: 5x - 5y - 20 = 0, p: \frac{x}{4} - \frac{y}{4} = 1, p: y = x - 4$
6.  $p = \{[4 - 7t, 6t - 5]; t \in \mathbb{R}\}, p: 6x + 7y + 11 = 0, p: -\frac{6x}{11} - \frac{7y}{11} = 1, p: y = -\frac{6x}{7} - \frac{11}{7}$
7.  $p = \{[5 - 5t, 8t - 3]; t \in \mathbb{R}\}, p: 8x + 5y - 25 = 0, p: \frac{8x}{25} + \frac{y}{5} = 1, p: y = 5 - \frac{8x}{5}$
8.  $p = \{[5 - 4t, 5 - 2t]; t \in \mathbb{R}\}, p: -2x + 4y - 10 = 0, p: -\frac{x}{5} + \frac{2y}{5} = 1, p: y = \frac{x}{2} + \frac{5}{2}$
9.  $p = \{[2t + 2, -t - 1]; t \in \mathbb{R}\}, p: -x - 2y = 0$ , úsekový tvar neexistuje,  $p: y = -\frac{x}{2}$
10.  $p = \{[8t - 4, 5 - t]; t \in \mathbb{R}\}, p: -x - 8y + 36 = 0, p: \frac{x}{36} + \frac{2y}{9} = 1, p: y = \frac{9}{2} - \frac{x}{8}$

## 2.2 Zapište všechny tvary rovnice přímky p dané bodem A a směrovým vektorem $\vec{u}$ .

1.  $p = \{[3t + 5, t + 4]; t \in \mathbb{R}\}, p: x - 3y + 7 = 0, p: -\frac{x}{7} + \frac{3y}{7} = 1, p: y = \frac{x}{3} + \frac{7}{3}$
2.  $p = \{[t + 4, 3 - 5t]; t \in \mathbb{R}\}, p: -5x - y + 23 = 0, p: \frac{5x}{23} + \frac{y}{23} = 1, p: y = 23 - 5x$
3.  $p = \{[3 - 2t, 2t + 3]; t \in \mathbb{R}\}, p: 2x + 2y - 12 = 0, p: \frac{x}{6} + \frac{y}{6} = 1, p: y = 6 - x$
4.  $p = \{[4t - 5, t + 5]; t \in \mathbb{R}\}, p: x - 4y + 25 = 0, p: -\frac{x}{25} + \frac{4y}{25} = 1, p: y = \frac{x}{4} + \frac{25}{4}$
5.  $p = \{[2t + 3, -3t - 3]; t \in \mathbb{R}\}, p: -3x - 2y + 3 = 0, p: x + \frac{2y}{3} = 1, p: y = \frac{3}{2} - \frac{3x}{2}$
6.  $p = \{[5t - 2, -t - 2]; t \in \mathbb{R}\}, p: -x - 5y - 12 = 0, p: -\frac{x}{12} - \frac{5y}{12} = 1, p: y = -\frac{x}{5} - \frac{12}{5}$
7.  $p = \{[3t + 1, 4]; t \in \mathbb{R}\}, p: 12 - 3y = 0, p: \frac{y}{4} = 1, p: y = 4$
8.  $p = \{[4t - 4, -5t - 3]; t \in \mathbb{R}\}, p: -5x - 4y - 32 = 0, p: -\frac{5x}{32} - \frac{y}{8} = 1, p: y = -\frac{5x}{4} - 8$
9.  $p = \{[3t - 2, -4t - 3]; t \in \mathbb{R}\}, p: -4x - 3y - 17 = 0, p: -\frac{4x}{17} - \frac{3y}{17} = 1, p: y = -\frac{4x}{3} - \frac{17}{3}$
10.  $p = \{[-3t, 2t - 1]; t \in \mathbb{R}\}, p: 2x + 3y + 3 = 0, p: -\frac{2x}{3} - y = 1, p: y = -\frac{2x}{3} - 1$

## 2.3 Zapište všechny tvary rovnice přímky p, která je kolmá na přímku q a prochází bodem A.

1.  $p = \{[6t + 3, 4t + 3]; t \in \mathbb{R}\}, p: 4x - 6y + 6 = 0, p: -\frac{2x}{3} + y = 1, p: y = \frac{2x}{3} + 1$
2.  $p = \{[1, 8t]; t \in \mathbb{R}\}, p: 8x - 8 = 0, p: x = 1, \text{směrnicový tvar neexistuje}$
3.  $p = \{[-t - 3, t + 4]; t \in \mathbb{R}\}, p: x + y - 1 = 0, p: x + y = 1, p: y = 1 - x$
4.  $p = \{[5 - 8t, 4t - 1]; t \in \mathbb{R}\}, p: 4x + 8y - 12 = 0, p: \frac{x}{3} + \frac{2y}{3} = 1, p: y = \frac{3}{2} - \frac{x}{2}$
5.  $p = \{[2t - 2, 3 - 3t]; t \in \mathbb{R}\}, p: -3x - 2y = 0, \text{úsekový tvar neexistuje}, p: y = -\frac{3x}{2}$
6.  $p = \{[t - 5, 2t - 2]; t \in \mathbb{R}\}, p: 2x - y + 8 = 0, p: -\frac{x}{4} + \frac{y}{8} = 1, p: y = 2x + 8$
7.  $p = \{[-6t - 1, 5t + 4]; t \in \mathbb{R}\}, p: 5x + 6y - 19 = 0, p: \frac{5x}{19} + \frac{6y}{19} = 1, p: y = \frac{19}{6} - \frac{5x}{6}$
8.  $p = \{[-t - 5, -5t]; t \in \mathbb{R}\}, p: -5x + y - 25 = 0, p: -\frac{x}{5} + \frac{y}{25} = 1, p: y = 5x + 25$
9.  $p = \{[5 - 7t, -5t - 5]; t \in \mathbb{R}\}, p: -5x + 7y + 60 = 0, p: \frac{x}{12} - \frac{7y}{60} = 1, p: y = \frac{5x}{7} - \frac{60}{7}$
10.  $p = \{[3, 6t + 5]; t \in \mathbb{R}\}, p: 6x - 18 = 0, p: \frac{x}{3} = 1, \text{směrnicový tvar neexistuje}$

## 2.4 Zapište všechny tvary rovnice přímky p, která s osou x svírá úhel $\phi$ a osu y protíná v bodě $[0, q]$ .

1.  $p = \{[t, \tilde{\infty}t - 4]; t \in \mathbb{R}\}, p: \tilde{\infty}x - y - 4 = 0, p: \tilde{\infty}x - \frac{y}{4} = 1, p: y = \tilde{\infty}x - 4$
2.  $p = \{[t, -\frac{\sqrt{3}t}{3} + 2]; t \in \mathbb{R}\}, p: -\frac{\sqrt{3}x}{3} - y + 2 = 0, p: \frac{\sqrt{3}x}{6} + \frac{y}{2} = 1, p: y = -\frac{\sqrt{3}x}{3} + 2$
3.  $p = \{[t, -\sqrt{3}t - 4]; t \in \mathbb{R}\}, p: -\sqrt{3}x - y - 4 = 0, p: -\frac{\sqrt{3}x}{4} - \frac{y}{4} = 1, p: y = -\sqrt{3}x - 4$
4.  $p = \{[t, -\sqrt{3}t + 5]; t \in \mathbb{R}\}, p: -\sqrt{3}x - y + 5 = 0, p: \frac{\sqrt{3}x}{5} + \frac{y}{5} = 1, p: y = -\sqrt{3}x + 5$
5.  $p = \{[t, -\frac{\sqrt{3}t}{3} - 4]; t \in \mathbb{R}\}, p: -\frac{\sqrt{3}x}{3} - y - 4 = 0, p: -\frac{\sqrt{3}x}{12} - \frac{y}{4} = 1, p: y = -\frac{\sqrt{3}x}{3} - 4$
6.  $p = \{[t, -2]; t \in \mathbb{R}\}, p: -y - 2 = 0, p: -\frac{y}{2} = 1, p: y = -2$

7.  $p = \{[t, -\frac{\sqrt{3}t}{3} - 4]; t \in \mathbb{R}\}, p : -\frac{\sqrt{3}x}{3} - y - 4 = 0, p : -\frac{\sqrt{3}x}{12} - \frac{y}{4} = 1, p : y = -\frac{\sqrt{3}x}{3} - 4$
8.  $p = \{[t, \sqrt{3}t - 1]; t \in \mathbb{R}\}, p : \sqrt{3}x - y - 1 = 0, p : \sqrt{3}x - y = 1, p : y = \sqrt{3}x - 1$
9.  $p = \{[t, \sqrt{3}t - 4]; t \in \mathbb{R}\}, p : \sqrt{3}x - y - 4 = 0, p : \frac{\sqrt{3}x}{4} - \frac{y}{4} = 1, p : y = \sqrt{3}x - 4$
10.  $p = \{[t, 0]; t \in \mathbb{R}\}, p : -y = 0, \text{úsekový tvar neexistuje}, p : y = 0$

## 2.5 Vypočítejte odchylku přímek $p$ a $q$

1.  $\phi = 0$
2.  $\phi = \frac{\pi}{3}$
3.  $\phi = \frac{\pi}{6}$
4.  $\phi = \frac{\pi}{3}$
5.  $\phi = \frac{\pi}{6}$
6.  $\phi = \frac{\pi}{2}$
7.  $\phi = \frac{\pi}{4}$
8.  $\phi = \frac{\pi}{4}$
9.  $\phi = \frac{\pi}{4}$
10.  $\phi = \frac{\pi}{3}$

## 2.6 Zapište rovnici přímky $p$ dané body $A$ a $B$ .

1.  $p = \{[4, 5 - 3t, t - 2]; t \in \mathbb{R}\}$
2.  $p = \{[5 - 10t, -2t, t + 2]; t \in \mathbb{R}\}$
3.  $p = \{[3 - 4t, 3t - 5, 8t - 3]; t \in \mathbb{R}\}$
4.  $p = \{[2t - 4, t + 2, 9t - 4]; t \in \mathbb{R}\}$
5.  $p = \{[3t, 6t - 1, -t - 1]; t \in \mathbb{R}\}$
6.  $p = \{[2t, 3 - 6t, 2 - 3t]; t \in \mathbb{R}\}$
7.  $p = \{[4 - t, 10t - 5, t - 4]; t \in \mathbb{R}\}$
8.  $p = \{[2t - 4, t - 3, t + 1]; t \in \mathbb{R}\}$
9.  $p = \{[4 - 4t, -5, 9t - 4]; t \in \mathbb{R}\}$
10.  $p = \{[2 - t, 4 - 8t, 5 - 6t]; t \in \mathbb{R}\}$

### 3 Rovina a její rovnice

#### 3.1 Zapište všechny tvary rovnice roviny $\sigma$ dané body $A, B$ a $C$ .

1.  $\sigma = \{[7s - 2, 5s + 5t, 4s + t - 5]; s, t \in \mathbb{R}\}, \sigma : 15x + 7y - 35z - 145 = 0$
2.  $\sigma = \{[4 - 3t, -5s - 2t + 4, -s - 2t + 5]; s, t \in \mathbb{R}\}, \sigma : -8x - 3y + 15z - 31 = 0$
3.  $\sigma = \{[4s + 6t - 2, -5s, -5s + 2t + 1]; s, t \in \mathbb{R}\}, \sigma : 10x + 38y - 30z + 50 = 0$
4.  $\sigma = \{[-2s - 3t - 2, -2s - 2t + 5, -7s - 4t + 4]; s, t \in \mathbb{R}\}, \sigma : 6x - 13y + 2z + 69 = 0$
5.  $\sigma = \{[-3s - 3t, s + t + 2, -s - 3t]; s, t \in \mathbb{R}\}, \sigma : 2x + 6y - 12 = 0$
6.  $\sigma = \{[6s + 4t - 5, 10s + 5t - 5, -3s - 3t - 2]; s, t \in \mathbb{R}\}, \sigma : 15x - 6y + 10z + 65 = 0$
7.  $\sigma = \{[4s - 2t, 2s - 5t + 1, 5s + 8t - 5]; s, t \in \mathbb{R}\}, \sigma : -41x + 42y + 16z + 38 = 0$
8.  $\sigma = \{[4s - t - 1, s - 7t + 2, 1 - 4t]; s, t \in \mathbb{R}\}, \sigma : 4x - 16y + 27z + 9 = 0$
9.  $\sigma = \{[-6s + t + 1, 2s - 2t + 2, 5t - 3]; s, t \in \mathbb{R}\}, \sigma : -10x - 30y - 10z + 40 = 0$
10.  $\sigma = \{[s + 3t - 3, 2s + 9t - 4, -4s - t + 3]; s, t \in \mathbb{R}\}, \sigma : -34x + 11y - 3z - 49 = 0$