학과: 게임 학부
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이름: 황미훈

1. $a(1,3,2) + b(6,0,-12) + C(1,-1,2) = (0, \frac{1}{3}, 2)$

$(a, 3a, 2a) + (6b, 0, -12b) + (C, -C, 2C) = (0, \frac{1}{3}, 2)$

$$\begin{cases} a+6b+C = 0 \\ 3a - C = \frac{1}{3} \\ 2a - 12b + 2C = 2 \end{cases} = \begin{cases} a + 6b + C = 0 \\ \boxed{9a - 3C = 1} \\ a - 6b + C = 1 \end{cases} \longrightarrow \boxed{2a + 2C = 1}$$

$$12b = -1$$

$9a - 3C = 2a + 2C \Rightarrow 7a = 5C \Rightarrow \boxed{a = \frac{5}{7}C}$

$12b = -1 \quad \boxed{b = -\frac{1}{12}}$

$a + 6b + C = 0 \Rightarrow a - \frac{1}{2} + C = 0 \Rightarrow a + C = \frac{1}{2}$

$\frac{5}{7}C + C = \frac{1}{2} \Rightarrow \frac{12}{7}C = \frac{1}{2} \quad \boxed{C = \frac{7}{24}}$

$a + \frac{7}{24} = \frac{12}{24} \quad \boxed{a = \frac{5}{24}}$

정답! $\boxed{\vec{u} = \frac{5}{24}\vec{V_1} - \frac{1}{12}\vec{V_2} + \frac{7}{24}\vec{V_3}}$

2. $|\vec{u}| = \sqrt{4+16+1+9} = \sqrt{30}$

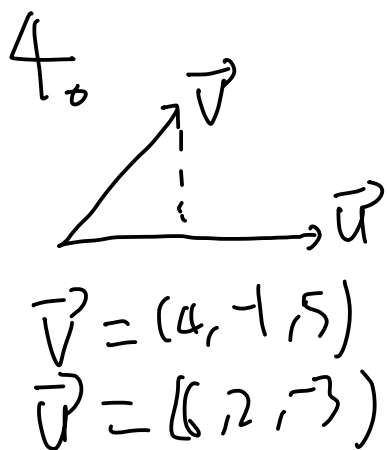$\vec{u}$와 반대방향의 크기가 3인 벡터: $-\frac{3}{\sqrt{30}} \cdot (-2, 4, -1, 3)$

정답: $\sqrt{30}, \left(\frac{6}{\sqrt{30}}, -\frac{12}{\sqrt{30}}, \frac{3}{\sqrt{30}}, -\frac{9}{\sqrt{30}} \right)$

3. $\cos\theta = \dfrac{\vec{u} \cdot \vec{v}}{|\vec{u}| \cdot |\vec{v}|} = \dfrac{2-6+1}{\sqrt{4+9+1} \cdot \sqrt{1+4+1}}$ 21.4

$= \dfrac{-3}{\sqrt{14} \cdot \sqrt{6}} = \dfrac{-3}{2\sqrt{21}} = -\dfrac{3\sqrt{21}}{84}$

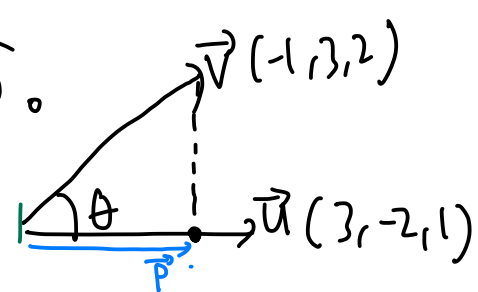$\theta = \cos^{-1}\left(-\dfrac{\sqrt{21}}{28} \right)$

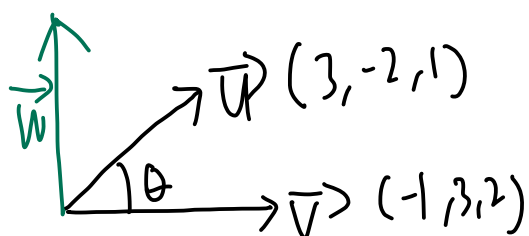정답: $\cos^{-1}\left(-\dfrac{\sqrt{21}}{28} \right)$

4.

$\text{proj}_{\vec{u}}\vec{v} = \dfrac{\vec{u} \cdot \vec{v}}{|\vec{u}|^2} \cdot \vec{u} = \dfrac{24-2-15}{36+4+9}(6, 2, -3)$

$= \dfrac{7}{49} \cdot (6, 2, -3) = \left(\dfrac{6}{7}, \dfrac{2}{7}, -\dfrac{3}{7} \right)$

$\vec{v} = (4, -1, 5)$
$\vec{u} = (6, 2, -3)$

정답: $\left(\dfrac{6}{7}, \dfrac{2}{7}, -\dfrac{3}{7} \right)$

5.

$\vec{V}(-1,3,2)$

$\vec{U}(3,-2,1)$

$\vec{P}$

θ

$\vec{P} = \dfrac{-3-6+2}{9+4+1}(3,-2,1)$

$= \dfrac{-7^{1}}{14_2}(3,-2,1)$

$= \left(-\dfrac{3}{2}, 1, -\dfrac{1}{2}\right)$

$\vec{U}(3,-2,1)$

$\vec{W}$

θ

$\vec{V}(-1,3,2)$

$\vec{W}$: $\vec{V}$의 $\vec{U}$에 직교하는 벡터성분

$\vec{W} = \vec{V} - \text{proj}_{\vec{U}}\vec{U}$

$= (-1,3,2) - \dfrac{1}{2}(-1,3,2)$

$= (-1,3,2) + \left(\dfrac{1}{2}, -\dfrac{3}{2}, -1\right)$

$= \left(-\dfrac{1}{2}, \dfrac{3}{2}, 1\right)$

정답! $\boxed{\left(-\dfrac{3}{2}, 1, -\dfrac{1}{2}\right), \left(-\dfrac{1}{2}, \dfrac{3}{2}, 1\right)}$

6. $\vec{PQ} = (-4,4,6)$

(a) $\dfrac{x-3}{-4} = \dfrac{y+1}{4} = \dfrac{z+2}{6}$ 의 방향벡터는 $(-4,4,6)$ ◎

(b) $\vec{PQ}$ 방향을 법선 벡터로 하면 $-4x+4y+6z=0$ 여기서 점 $(1,1,4)$ 대입하면

$-4+4+24 = 24 \neq 0$ 이므로 특린 답이다. ⊗

(c) 방향벡터는 $(2,-2,-3)$ 이므로 벡터 $-\dfrac{1}{2}\vec{PQ}$ 와 같다. ◎

(d) 법선 벡터 $(1,-5,4)$ 를 $\vec{n}$ 이라고 하면 $\vec{n} \perp \vec{PQ}$ 이므로 $\vec{n} \cdot \vec{PQ} = 0$.

$(1,-5,4) \cdot (-4,4,6) = -4-20+24 = 0$ 수직이다. ◎

(e) $\vec{AB} = (-2, 2-3)$ 이고 $\vec{BA} = (2-2,3)$ 이므로 $\dfrac{1}{2}\vec{PQ} = (-2,2,3)$

이랑 다르므로 평행은 아니다. ⊗

정답! $\boxed{(a), (c), (d)}$

7. $\overrightarrow{PQ} = (-1, 2, -2)$

① $(2, 3, -1) + t(-1, 2, -2) = (-t+2, 2t+3, -2t-1)$

② $x = -t+2, \ y = 2t+3, \ z = -2t-1$

③ $\dfrac{x-2}{-1} = \dfrac{y-3}{2} = \dfrac{z+1}{-2}$

8. 법선 벡터 : $(5, -1, 3)$

스칼라 방정식: $5(x-3) - 1(y-2) + 3(z-1) = 5x - y + 3z - 15 + 2 - 3$

$$= 5x - y + 3z - 16 = 0$$

정답! $\boxed{5x - y + 3z = -16}$

9. 평면의 벡터방정식: $(2+t_1-t_2, -3-2t_1+5t_2, -2+4t_1+t_2)$

평면의 매개변수 방정식: $x = 2+t_1-t_2, \ y = -3-2t_1+5t_2, \ z = -2+4t_1+t_2$

법선벡터를 $\vec{n} = (a, b, c)$ 둔다. $\vec{n} \cdot \vec{u} = \vec{n} \cdot \vec{v} = 0$

$(a, b, c) \cdot (1, -2, 4) = a - 2b + 4c = 0$

$(a, b, c) \cdot (-1, 5, 1) = -a + 5b + c = 0 \xrightarrow{-1 *} a - 5b - c = 0$

$\cancel{a} - 2b + 4c = \cancel{a} - 5b - c \ \rightarrow \ 3b = -5c \ \rightarrow \ b = -\dfrac{5}{3}c$

$a - 5b - c = 0 \ \rightarrow \ a + \dfrac{25}{3}c - c = 0 \ \rightarrow \ a = -\dfrac{22}{3}c$

$(a, b, c) = \left(-\dfrac{22}{3}c, -\dfrac{5}{3}c, c\right) = (22, 5, -3) = \vec{n}$

스칼라 방정식: $22(x-2) + 5(y+3) - 3(z+2) = 22x + 5y - 3z - 35 = 0$

───── 정답 ─────

매개 변수 방정식: $x = 2 - t_1 + t_2, \ y = -3 - 2t_1 + 5t_2, \ z = -2 + 4t_1 + t_2$

스칼라 방정식: $22x - 5y - 3z - 35 = 0$