Discussion Problems for next time

2.6 319–330 sketch the surface given by the equation shown.

2.7 problems on syllabus.

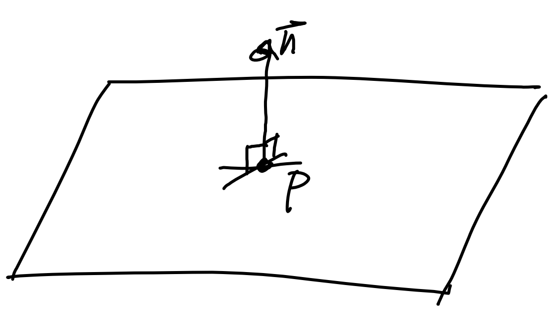
3.1 " " "

Exam will cover sections 2.1–2.7 and 3.1, 3.2, 3.4
Tentatively scheduled for 9/21.

Section 2.5

268 $P(3,2,2)$ $\vec{n} = \langle 2,3,-1 \rangle$

Find the cartesian equation of the plane with normal vector $\vec{n}$ and containing point P.



$$\vec{n} \cdot \langle x, y, z \rangle = \vec{n} \cdot \vec{P}$$

$$\vec{n} \cdot \langle x, y, z \rangle = \vec{n} \cdot \langle 3, 2, 2 \rangle$$

$$2x + 3y - z = 2 \cdot 3 + 3 \cdot 2 - 2$$

$$\boxed{2x + 3y - z = 10}$$

(271) $4x+5y-10z+20=0$

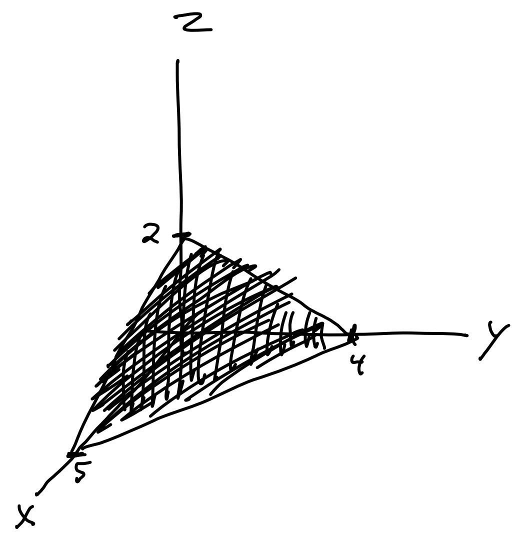
$4x+5y+10z=20$

(a) $\vec{n}=\langle 4,5,10\rangle$

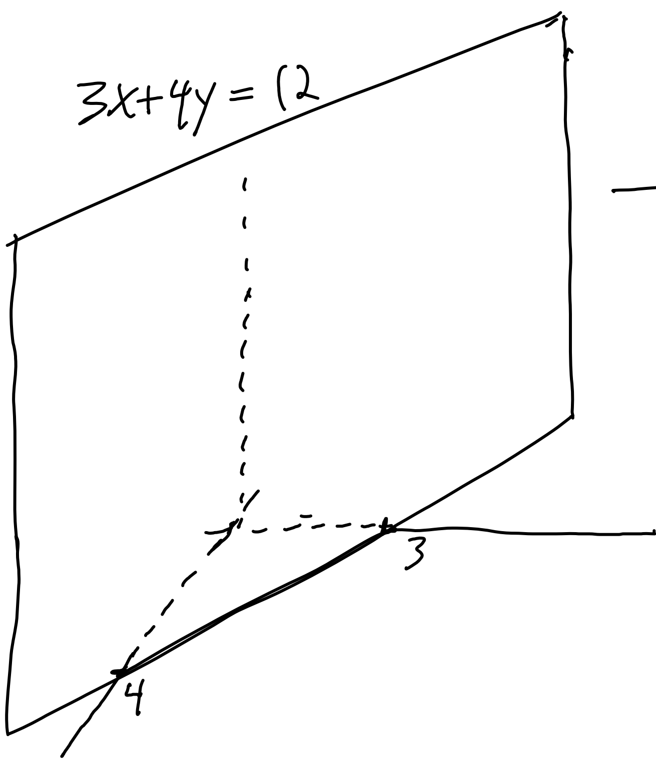
(b)

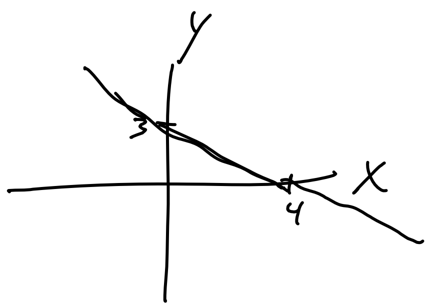
x-axis	y-axis	z-axis
$y=z=0$	$x=z=0$	$x=y=0$
$4x=20$	$5y=20$	$10z=20$
$x=5$	$y=4$	$z=2$

(c)



(272) $3x+4y=12$





$3x=12$ $\quad$ $4y=12$

$x=4$ $\quad$ $y=3$

No z-intercept

281

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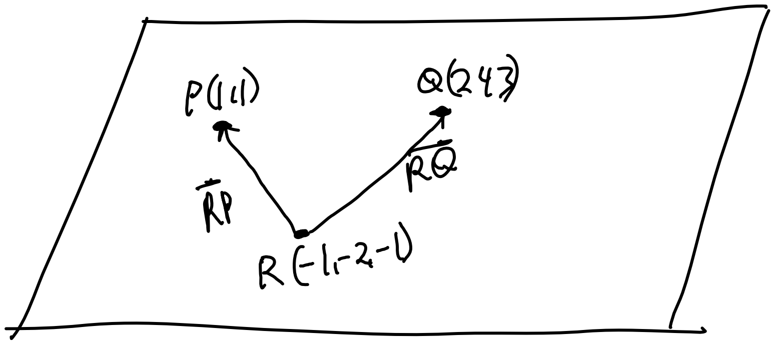


$\vec{RP} = \langle 2, 3, 2 \rangle$

$\vec{RQ} = \langle 3, 6, 4 \rangle$

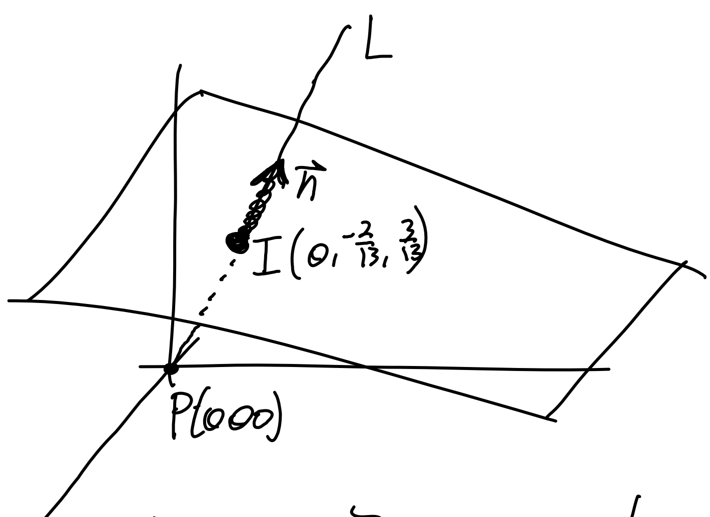
Let $\vec{n} = \vec{RP} \times \vec{RQ} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 3 & 2 \\ 3 & 6 & 4 \end{vmatrix} = \langle 0, -2, 3 \rangle$

<u>equation of the plane</u>

$$\vec{n} \cdot \langle x, y, z \rangle = \vec{n} \cdot \langle 1, 1, 1 \rangle$$

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

<u>normal line through the plane and the origin</u>



L
$$\boxed{\begin{aligned} x &= 0 + 0t &&= 0 \\ y &= 0 - 2t &&= -2t \\ z &= 0 + 3t &&= 3t \end{aligned}}$$

<u>extra</u> what are the coordinates of I?

Let $(x\,y\,z) = (0, -2t, 3t)$ in $-2y + 3z = 1$ so $4t + 9t = 1$

$13t = 1$

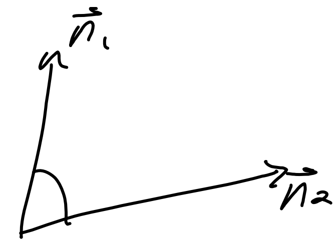
$t = \frac{1}{13}$

I
$$\boxed{\begin{aligned} x &= 0 \\ y &= \frac{-2}{13} \\ z &= \frac{3}{13} \end{aligned}}$$

(29) Angle between two planes is The angle between Their normal vectors

$x+y+z=0$ $\qquad$ $2x-y+z=7$

$\vec{n}_1=\langle 1\ 1\ 1\rangle$ $\qquad$ $\vec{n}_2=\langle 2,-1,1\rangle$



$$\cos(\theta)=\frac{\vec{n}_1\cdot\vec{n}_2}{|\vec{n}_1||\vec{n}_2|}=\frac{2}{\sqrt{3}\sqrt{6}}=\frac{2}{\sqrt{18}}$$

$$\theta=\operatorname{Arccos}\left(\frac{2}{\sqrt{18}}\right)\approx 61.87^\circ$$