16.6 homework 1, 3, 5, 13, 17, 21, 25, 33, 35, 39, 41, 43, 45, 47, 49

① $r(u,v) = \langle u+v,\ u-2v,\ 3+u-v \rangle$ $P(4,-5,1)$ $Q(6,4,6)$

P

$u+v=4$ $u+v=4$ $2v-2=4$

$u-2v=-5$ $u-2v=-5$ $v=3$

$3+u-v=1$ $u-v=-2$ $u=v-2$

$u=1$ $v=3$

P lies on $r(u,v)$ surface

Q

$u+v=0$ $u=-v$

$u-2v=4$

$3+u-v=6$ $u-v=3$

$-2v=3$ $v=-\frac{3}{2}$ $u=\frac{3}{2}$

$\frac{3}{2}+2\left(\frac{3}{2}\right)=4$

$\frac{9}{2} \neq 4$

Q doesn't lie on $r(u,v)$ surface

③ $r(u,v) = \langle u+v,\ 3-v,\ 1+4u+5v \rangle$

$x=u+v$ $y=3-v$ $z=1+4u+5v$

$u=x+y-3$ $v=3-y$ $z=1+4u+15-5y$

$z=1+4x+4y-12+15-5y$

$z=4+4x-y$

$4x-y-z=-4$

Equation with surface of a plane

$r(0,0) = \langle 0, 3, 1 \rangle$