PQ1 Solutions

(16) $x^2+y^2=(r(z))^2$

solve $z=\frac{1}{2}y^2+1$ for y^2

$\frac{1}{2}y^2=z-1$

$y^2=2(z-1)$

$x^2+y^2=2z-2$

(17) $(-2\sqrt{2}, 2\sqrt{2}, 2)$

(a) $\arctan -1 = -\frac{\pi}{4}$ in range of arctan. adjust to $-\frac{3\pi}{4}$ (where the angle actually is)

$y=\arctan x$
$-\frac{\pi}{2}<y<\frac{\pi}{2}$

$r=\sqrt{8+8}=4$

$z=2$

$(4, \frac{3\pi}{4}, 2)$

(b) $\rho=\sqrt{8+8+4}=\sqrt{20}=2\sqrt{5}$

See above $\theta=\frac{3}{4}\pi$

$\phi=\arccos\frac{2}{2\sqrt{5}}$

$(2\sqrt{5}, \frac{3}{4}\pi, 63.4^\circ)$

(18) $x^2+y^2+z^2=16$

(a) $x^2+y^2=r^2 \quad z^2=z^2$

$r^2+z^2=16$

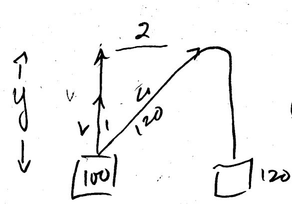
(b) $\rho^2=x^2+y^2+z^2$

$\rho=16$

#10 Revisited (using Vectors)

Use the projection of u onto v. (the magnitude)

u: (unit) x (mag); v: unit



$u=120\frac{\langle 2,y\rangle}{\sqrt{2^2+y^2}}=\frac{240}{\sqrt{2^2+y^2}}i+\frac{120y}{\sqrt{2^2+y^2}}j$

let $v=\langle 0,1\rangle$ $\quad \|v\|=1$

$\|proj_v u\|=\left\|\frac{u\cdot v}{\|v\|^2}(v)\right\|=\left\|\frac{120y}{\sqrt{2^2+y^2}}j\right\|=\|100yj\|$

take $\|\ \|$

$\frac{12\cancel{0}y}{\sqrt{2^2+y^2}}=10\cancel{0}y$

$12y=\sqrt{2^2+y^2}(10)$

$12^2y^2=(4+y^2)100$

$44y^2=400$

$y^2=\frac{100}{11}$; $y=\frac{10\sqrt{11}}{11}$

$=3.0284$