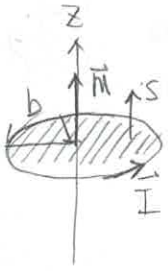
1.

Note that for question 1, the solenoid is exactly the same with the one in Quiz 13-2 except that the core is changed (i.e. n remains the same.)

As we know, $B = \mu_0 n I$. With B and n remains the same as in Quiz 13-2 we can find $I \propto \frac{1}{\ell r}$, so $I = \frac{10}{100} A = 0.1\ A$.

※ The solution $n \doteqdot 80000$ for Quiz 13-2 is an approximation, you could get a neat and precise value of I without assuming $n = 80000$

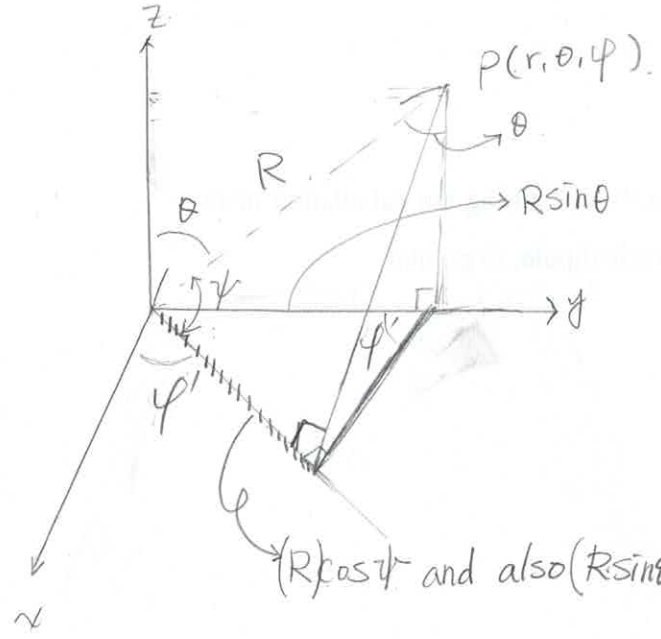
2.



$\vec{m} = I\vec{S} = I\pi b^2 \hat{a}_z$

$\vec{I}$: current (vector)
I: current value (scalar)
$\vec{S}$: the surface enclosed by current loop (vector, same direction with $\nabla \times \vec{I}$)
$\vec{m}$: magnetic dipole moment (vector)
b: radius for the loop (for circular loop) (scalar)

3.



If we set $P(r,\theta,\varphi)$ in x-y-z coordinate, we can get picture 1. We can see that $R\cos\psi$ is the projection of R on x-y plane. We can get same result by projecting R on y-axis first and then projecting R on x-y plane.

picture 1.