Formulas for Test 1

wave traveling in the positive x-direction: wave traveling in the negative x-direction:	$y(x,t) = Asin(kx - \omega t + \phi)$ $y(x,t) = Asin(kx + \omega t + \phi)$
Double slit or grating with **constructive interference:** Single Slit with **destructive interference:**	$dsin\theta = m\lambda$ $m = 0, 1, 2, ...$ $wsin\theta = m\lambda$ $m = 1, 2, ...$
Photoelectric Effect:	$E = hf - \phi$
Time-dependent Shroedinger equation in one dimension:	$\frac{-\hbar^2}{2m}\frac{\partial^2\psi(x,t)}{\partial x^2} + U(x)\psi(x,t) = i\hbar\frac{\partial\psi(x,t)}{\partial t}$
Time-independent Shroedinger equation in one dimension:	$\frac{-\hbar^2}{2m}\frac{\partial^2\psi(x,t)}{\partial x^2} + U(x)\psi(x,t) = E\psi(x,t)$
Probability of finding the particle at time t in an interval Δx about the position x:	$\|\psi(x,t)\|^2\Delta x$
Particle in an infinite square well:	$E_n = \frac{n^2\pi^2\hbar^2}{2mL^2}$, $n = 1, 2, 3, ...$ $\psi_n(x,t) = \sqrt{\frac{2}{L}}sin(\frac{n\pi x}{L})e^{\frac{-iE_nt}{\hbar}}$
Particle in a harmonic well:	$E_n = (n + \frac{1}{2})\hbar\omega = (n + \frac{1}{2})hf$, $n = 0, 1, 2, ...$
Spherical coordinates:	$z = rcos\theta$, $y = rsin\theta sin\phi$, $x = rsin\theta cos\phi$ $r = \sqrt{x^2 + y^2 + z^2}$, $tan\theta = \frac{\sqrt{x^2+y^2}}{z}$, $tan\phi = \frac{y}{x}$
Orbital angular momentum:	$L^2 = (l(l+1))\hbar^2$ $l = 0, 1, 2, ...$ $L_z = m\hbar$, m can take on values from -l to l in integer steps
Tunneling transmission coefficient T:	$T = e^{-2bL}$ where $b = \sqrt{\frac{2m(U_0-E)}{\hbar^2}}$
Hydrogen atom:	$E_n = \frac{m_e e^4}{2\hbar^2 n^2} = \frac{-13.6}{n^2}$ eV
Hydrogenic atoms:	$E_n = \frac{m_e Z^2 e^4}{2\hbar^2 n^2} = \frac{-Z^2 * 13.6}{n^2}$ eV
Magnetic moment for orbital angular momentum:	$\mu_z = -\mu_B m$
Magnetic moment for spin angular momentum:	$\mu_z = -2\mu_B m_s$