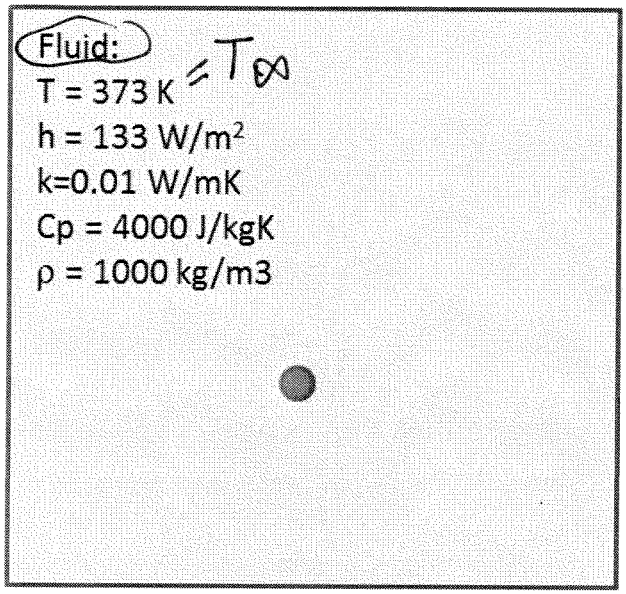
**Name (2 points):** Dawson
ChBE 3200
Quiz 8

Bi < 0.1




Solid sphere at T = 273 K = $T_s$ or $T_o$
Is dropped in large volume of fluid:
D= 2 cm
k=0.6 W/mK
Cp = 1000 J/kgK
ρ = 2000 kg/m3

$\frac{k}{\rho C_p} = \alpha = 3\times10^{-7}\ \frac{m^2}{s}$

R = 0.01 m

**Q1 (3 points): Determine the Biot number.**

$Bi = \frac{h\ V/A}{k_{Body}}$

$\frac{V}{A} = \frac{4/3\ \pi R^3}{4\pi R^2} = \frac{R}{3}$

$Bi = \frac{(133)(0.01)}{3(0.6)} = 0.74$

**Q2 (3 points): Determine the Fourier modulus after 10 hours.**

$Fo = \frac{\alpha\ t}{(V/A)^2}$

$t = 10\ hrs\ (3600\ s/hr) = 3.6\times10^4$

$Fo = \frac{(3\times10^{-7})(3.6\times10^4)}{\left(\frac{0.01}{3}\right)^2}$

$Fo = 972$

**Q3 (2 points): What approach would you take to solving this problem to determine temperature T at t = 10 hours?**

Bi > 0.1 internal resistance dominant.
Sphere is finite media.
Hessler Charts would be used.