$$1.39a \quad \mu = 3.55E-5 \ \frac{\text{kg}}{\text{m}\cdot\text{s}}$$

$$1.39b \quad \mu = 3.52E-5 \ \frac{\text{kg}}{\text{m}\cdot\text{s}}$$

$$1.54 \quad M = \frac{\pi\mu\Omega R^4}{h}$$

$$1.80 \quad F = x^2y - y^3/3 + \text{constant}$$

$$2.12 \quad h = 0.08 \text{ m}$$

$$2.21 \quad h = 6.49 \text{ m}; \mathrm{P_B} = 251 \text{ kPa}$$

$$2.33 \quad P_B = 24.8 \text{ psi}$$

$$2.35 \quad p_1 - p_2 = 26100 \text{ Pa}$$

$$2.62 \quad h = 10.6 \text{ ft}$$

$$2.68 \quad P = 18040 \text{ N}$$

$$2.75 \quad \rho_s = \frac{2h}{3t\cos\theta}\rho$$

$$2.84 \quad F_{total} = 8825 \text{ N acting at } -56.31^{\text{o}} \text{ from the horizontal}$$

$$2.109 \quad h = \frac{W(SG-1)}{SG\gamma_o(\pi D^2/4)}$$

$$2.115 \quad \theta = 30.6^o$$

$$2.150 \quad h = 5.5 \text{ cm}$$

$$2.155 \quad \Omega = 138 \text{ rpm}$$

$$3.12 \quad \Delta t = 46 \text{ s}$$

$$3.14a \quad \frac{dh}{dt} = \frac{Q_1 + Q_3 - Q_2}{\pi d^2/4}$$

$$3.14b \quad V_2 = 4.13 \text{ m/s}$$

$$3.53a \quad F_{drag} = (p_1 - p_2)\pi R^2 - (1/3)\rho\pi R^2 U_o^2$$

$$3.53b \quad F_{drag} = (p_1 - p_2)\pi R^2 - 0.02\rho\pi R^2 U_o^2$$

$$3.54 \quad F_{bolts} \approx 163 \text{ N}$$

$$3.55a \quad F_x = \rho A_j (V_j - V_c)^2 (1 - \cos\theta)$$

$$3.55b \quad P = \rho A_j V_c (V_j - V_c)^2 (1 - \cos\theta)$$

$$3.55c \quad V_c = 0 \qquad 3.55d \quad V_c = V_j/3$$

$$3.133 \quad h_f = 8.7 \text{ m}$$

$$3.139 \quad P_p = 8.4 \text{ kW}$$

$$3.145 \quad Q_{river} \approx 76.5 \text{ m}^3/\text{s}$$

$$3.146 \quad h = 3.92 \text{ ft}$$

$$3.154 \quad H = 8.51 \text{ m}$$

$$3.165 \quad Q = \frac{A_2\sqrt{2gh(\rho_m - \rho)/\rho}}{\sqrt{1 - (D_2/D_1)^4}}$$

3.175 $Q_1 = 3.74 \ \dfrac{\mathrm{m}^3}{\mathrm{s} \cdot \mathrm{m}}$

3.178 $h_2 = 2.03$ ft (subcritical) or h = 0.735 ft (supercritical)

5.60 $F_{prototype} = 4300$ N

5.74 $M_p = 88 \ \mathrm{kN} \cdot \mathrm{m}$

5.82*a* V_p, ft/s : 19.6 30.2 40.8

5.82*b* F_p, lbf : 14600 31800 54600

6.10 $h_f = +7.8$ m which implies flow is from A to B

6.52 $p_1 = 2.38\mathrm{E}6$ Pa

6.76 $Q = 0.00413 \ \mathrm{m}^3/\mathrm{s}$

6.78 $Q = 0.00705 \ \mathrm{m}^3/\mathrm{s}$

6.83 $d = 0.0305$ m

6.91 $\Delta p = 23000$ Pa

6.92 $Q = 0.422 \ \mathrm{m}^3/\mathrm{s}$

6.102 P = 5.31 hp

6.103 $Q = 0.111 \ \mathrm{ft}^3/\mathrm{s}$

6.105 $p_1 = 3.46$ MPa

7.5 Flat plate theory $\mathrm{x_e} = 6.55$ ft

Eq. 6.5 $\mathrm{x_e} = 39$ ft

7.9*a* $\dfrac{\delta}{x} = \dfrac{4.80}{\sqrt{Re_x}}$

7.9*b* $\dfrac{\theta}{x} = \dfrac{0.655}{\sqrt{Re_x}}$

7.9*c* $\dfrac{\delta^*}{x} = \dfrac{1.743}{\sqrt{Re_x}}$

7.9*d* $\dfrac{\delta^*}{\theta} = 2.66$

7.31 $F_d = 38$ lbf

7.33*a* $\dfrac{\delta}{x} = \dfrac{0.37}{Re_x^{1/5}}$

7.33*b* $C_f = \dfrac{0.0577}{Re_x^{1/5}}$

7.33*d* $C_D = \dfrac{0.072}{Re_L^{1/5}}$

7.88 P = 86 hp

9.3 $s_2 - s_1 = 1500 \ \mathrm{J/kg} \cdot \mathrm{K}$

9.10 $Ma = 0.78$

9.19*a* $T_o = 641$ K

9.19*b* $Ma = 3.58$

9.21a $T_2 = 336$ K

9.21b $Ma_2 = 1.13$

9.21c $T_{o1} = 401$ K

9.21d $P_{01} = 171$ kPa

9.21e $V_1 = 214$ m/s

9.21f $Ma_1 = 0.71$

9.35a $Ma_1 = 0.50$

9.35b $\dot{m} = 9.03$ kg/s

9.35c $T_1 = 370$ K

9.35d $A^* = 0.0756$ m^2

9.53a $V_e = 226$ m/s

9.53b $Ma_e = 0.69$

9.53c $P_o = 139000$ Pa

9.57a $P_{o1} = 159100$ Pa

9.57b $\dot{m} = 0.333$ kg/s

9.59a $Ma_1 = 0.556$

9.59b $P_o = 172$ kPa

9.63a $P_3 = 59200$ Pa

9.63b $\dot{m} = 0.0241$ kg/s

9.64a $\dot{m} = 0.150$ kg/s

9.64b $\dot{m} = 0.157$ kg/s

9.64c $\dot{m} = 0.157$ kg/s