CE 313 Hydraulic Engineering
Winter 2013 Test Form 1

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Quiz 7 **Name:** _____

Answer the following questions to the best of your ability.

1. (15pts)When water flows steadily in a channel that is sloped downward,
   a. The flow depth will decrease only if the slope is reduced (e.g; S_o is reduced).
   b. The flow depth could increase, decrease, or stay the same even if the slope stays constant.
   c. The flow depth remains uniform unless the slope of the bottom changes.
   d. The flow depth will increase only if the slope is reduced.

2. (15pts)A surface wave produced by a disturbance can travel upstream,
   a. When the flow is subcritical.
   b. When the flow is critical.
   c. When the flow is either subcritical or supercritical, depending on the Froude number.
   d. When the flow is supercritical.

3. (15pts)For a hydraulic jump to occur when water flows down a channel
   a. The upstream flow must be critical
   b. The upstream flow must be subcritical
   c. The upstream flow must be supercritical
   d. The Froude number must be unity

4. (15pts)When a hydraulic jump occurs in a channel,
   a. The energy for the flow upstream and that downstream of the jump are equal.
   b. The depth of the flow upstream and the downstream of the jump are equal.
   c. The momentum of the flow upstream and that downstream of the jump are equal.
   d. The Froude number of the flow upstream and that downstream of the jump are equal.

5. (20pts) A rectangular channel 3m wide carries $10m^3/s$ at a depth of 2m. Is the flow subcritical or super critical? For the same flowrate, what depth will give critical flow?

6. (20pts) Water flows in a horizontal, rectangular channel with an initial depth of 2ft and initial velocity of 23ft/s. Determine all of the possible depths downstream if losses are negligible.

$$\rho_w = 999\frac{kg}{m^3} \text{ and } v_w = 1.12 \times 10^{-6} m^2/s$$

$$h_L = f\frac{l}{D}\frac{V^2}{2g}$$

$$h_L = K_L\frac{V^2}{2g}$$

$$Re = \frac{\rho VD}{\mu} = \frac{VD}{v}$$

$$Q = C_n Q_{ideal} = C_n A_n \sqrt{\frac{2(p_1 - p_2)}{\rho(1-\beta^4)}}$$

$$Q = C_v Q_{ideal} = C_v A_T \sqrt{\frac{2(p_1 - p_2)}{\rho(1-\beta^4)}}$$

$$\beta = \frac{d}{D}$$

$$Fr = \frac{v}{\sqrt{gy}}$$

$$C = \sqrt{gy}$$

$$E = y + \frac{V^2}{2g}$$

$$V = \frac{K}{n} R_h^{2/3} S_0^{1/2}$$

Newton-Raphson method

$$y^{n+1} = y^n - \frac{F^n}{[dF/dy]^n}$$