

Your answers are not clear and are inconsistent with the problems. Send me an email if you would like to discuss.

$$1. \frac{dy}{dx} = \frac{S_0 - S}{1 - F^2}$$

$$A = y(b + zy) \quad R = \frac{A}{b + 2y\sqrt{1+z^2}}$$

$$n = 0.013$$

$$B = 1.6$$

$$S_0 = 0.0005$$

$$Q = 1.7 \text{ m}$$

$y = \text{varies from } 0.85 - 1.0 \text{ m}$

$$Q = \frac{1}{n} AR^{2/3} S_0^{1/2} = \frac{1}{n} (By_0) \left[\frac{By_0}{B + 2y_0} \right]^{2/3} S_0^{1/2}$$

$$\frac{1}{7} = \left(\frac{1}{0.013} \right) (1.6y_0) \left[\frac{1.6y_0}{1.6 + 2y_0} \right]^{2/3} [0.0005]^{1/2}$$

$$y_0 = 1.047 \text{ m}$$

NB: Manning's equation assuming normal depth is

$$Q = \frac{1.49}{n} AR^{2/3} S_0^{1/2}$$

\swarrow
 $\frac{A}{P_w}$

Additional iterations should be run to be 95% sure that your estimate of the depth is accurate within ± 5 units.

According to the Latin Hypercube sampling method - sample means are much close together for the same number of iterations

1. $n = 0.015$ and $S_0 = 0.005 \text{ m/m}$ are given in the problem definition, it is unclear why different values were used in your answer.
2. What is $B = 1.6$?
3. Your calculations do not show how you obtained $y_n = 1.047 \text{ m}$. There are also no calculations showing why $y_n = 1.047 \text{ m}$ is an answer.
4. Need to show and comment on why additional iterations may be needed. Unclear here.

Q1: 0 - See posted solutions.

2.

$$F = 0.03$$

$Q = \frac{V}{t}$ for voluming gives

$$V = Qt$$

$$V = \left(\frac{5.00 \text{ L}}{1 \text{ min}} \right) (75 \text{ y}) \left(\frac{1 \text{ m}^3}{10^3 \text{ L}} \right) \left(5.26 \times 10^5 \frac{\text{min}}{\text{y}} \right)$$

$$2.0 \times 10^5 \text{ m}^3 - \text{iteration 1}$$

$$\bar{v}_1 = \frac{(0.500 \text{ L/s}) (10^3 \text{ m}^3 \text{ L})}{\pi (9.00 \times 10^3 \text{ m})^2} = 1.96 \text{ m/s} - \text{iteration 2}$$

$$\frac{0.03 \text{ cm}^2}{\pi (1.96)} = 0.025 \text{ m} - \text{iteration 3}$$

Additional iterations are not needed since the estimate of the depth gets closer with each iteration

Q2: 0 - It is not clear what the solutions on this page represent. It is not clear which assignment question is being answered. See posted solutions.

$$3 \text{ a) } V = \frac{Q}{A}$$

where Q = flow rate through pipe
 A = pipe cross sectional area

$$A = \frac{\pi D^2}{4} = \frac{\pi \times 0.8^2}{4} = 0.5 \text{ m}^2$$

$$V = \frac{25000}{3600} \times \frac{1}{0.5} = 1.39 \text{ m/sec}$$

$$b) \quad K = \frac{0.0165 \times 250}{0.8} = 5.16$$

$$K = 5.16 + 9.95 = 15.11$$

$$HD = \frac{15.11 \times (1.39)^2}{2 \times 9.81} = 1.49 \text{ m/sec}$$

c) Pump 1 is better as it can provide a minimum flow of 1.394 sec

Q3: 0 - See posted solutions.

$$4. a) \quad v = \frac{1.49(0.957)^{2/3}(0.0025)^{1/2}}{0.05} = 2.05 \text{ ft/sec}$$

$$T_i = \frac{3000}{(3600)(2.05)} = 0.406 \text{ hr} \quad \boxed{0}$$

$$v = \frac{0.59(3)^{2/3}(0.015)^{1/2}}{0.015} = 10 \text{ ft/sec}$$

$$T_i = \frac{2000}{(3600)(10)} = 0.056 \text{ hr}$$

$$T_c = 0.256 + 0.240 + 0.406 + 0.056 = 0.958 \text{ h} = 57.5 \text{ min}$$

$$b) \quad Re = \frac{vD}{\nu} = \frac{(0.251 \text{ m/s})(0.3 \text{ m})}{(1 \times 10^{-6} \text{ m}^2/\text{s})} = 4.9 \times 10^4 \quad \boxed{0}$$

c) $P(F) = 1 - 100$
 where 1 is the total probability of the event occurring.

$$P = 0.99 \quad \boxed{0}$$

- d) i) Drainage areas are smaller than 300 acres $\boxed{1}$
 ii) Peak flow occurs when the entire catchment is contributing
 (iii) Rainfall intensity is uniform over a duration of time.
 iv) Rational coefficients are independent of the intensity of the rainfall.
 v) The rational method does not account for storage in drainage areas.