Student Name: _____   SPRING 2016

CE 3354 Engineering Hydrology
Exam 2, Spring 2016 – OPEN COMPUTER PORTION

Students should write their name on all sheets of paper. Students are may use printed notes and book excerpts to help answer questions.

Students are permitted to use **laptops** to complete the open computer portion of the exam.

When you complete this portion of the exam (open computer), submit it to the instructor and you are done.

1. Build a HEC HMS rainfall-runoff model for a single sub-basin watershed with the properties in Table 1. Figure 1 is a HEC-HMS model configuration that should give you an idea of what to build in HEC-HMS. The HEC-HMS model should simulate a 48 hour period of interest. Use the model output to complete Table 2.

Table 1: HEC-HMS Parameter Values for a Single Sub-Basin watershed

Item	Value	Units
Drainage Area	0.218	Square Miles
Composite CN	67	Dimensionless
Basin Lag	17.4	Minutes
Rainfall Rate (Hour 0 – Hour 24)	0.375	Inches per hour
Rainfall Rate (Hour 25 – Hour 48)	0.0	Inches per hour

Table 2: Summary output values – Complete this table using HEC-HMS output

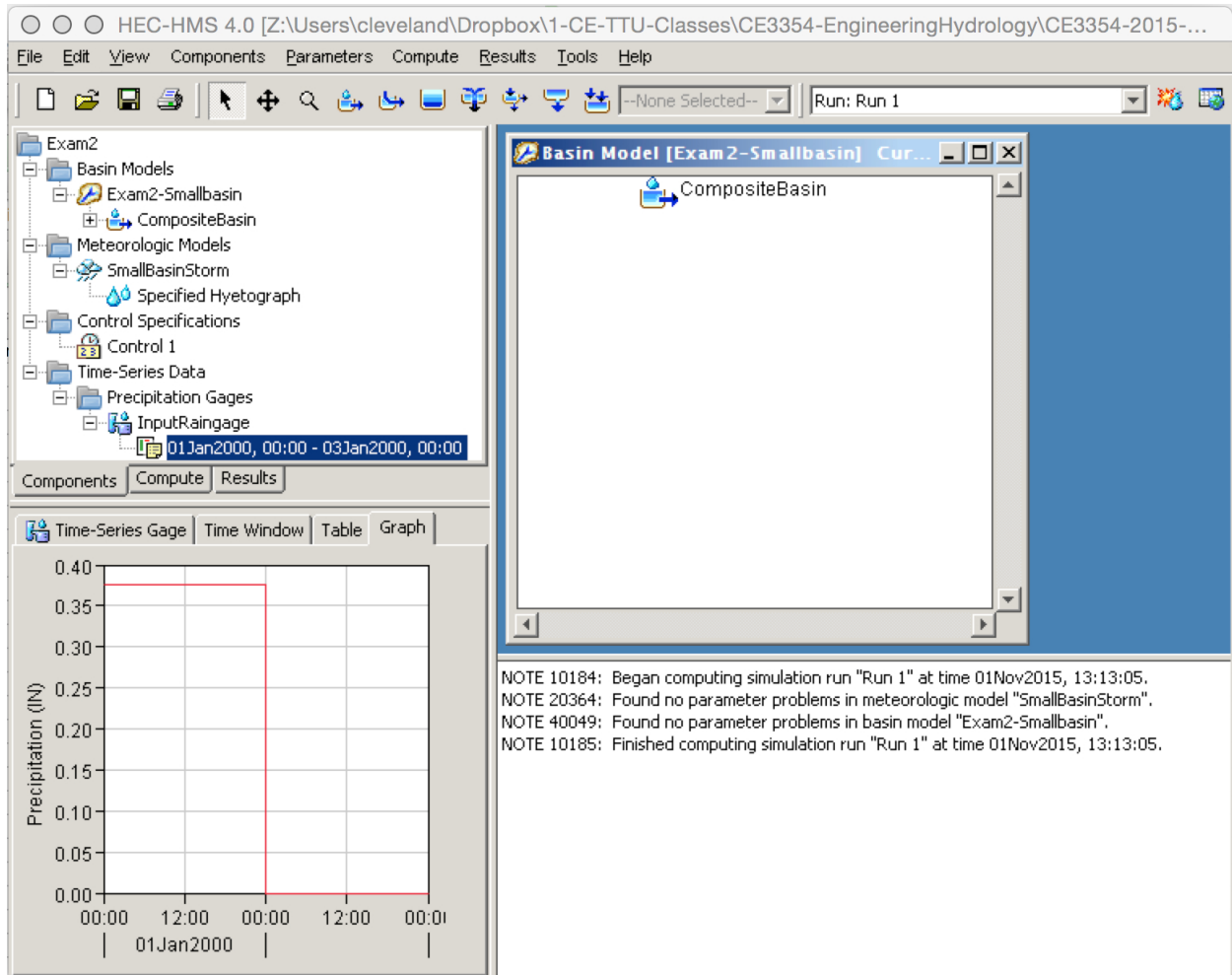| Item	Value	Units
Peak Discharge Rate	_____	Cubic Feet per Second
Time of Peak Discharge	_____	Elapsed Hours, or Clock Time from HMS
Total Runoff	_____	Watershed inches
Total Precipitation	_____	Inches
Excess Precipitation	_____	Inches

Figure 1: Configuration of Small Watershed HMS Model

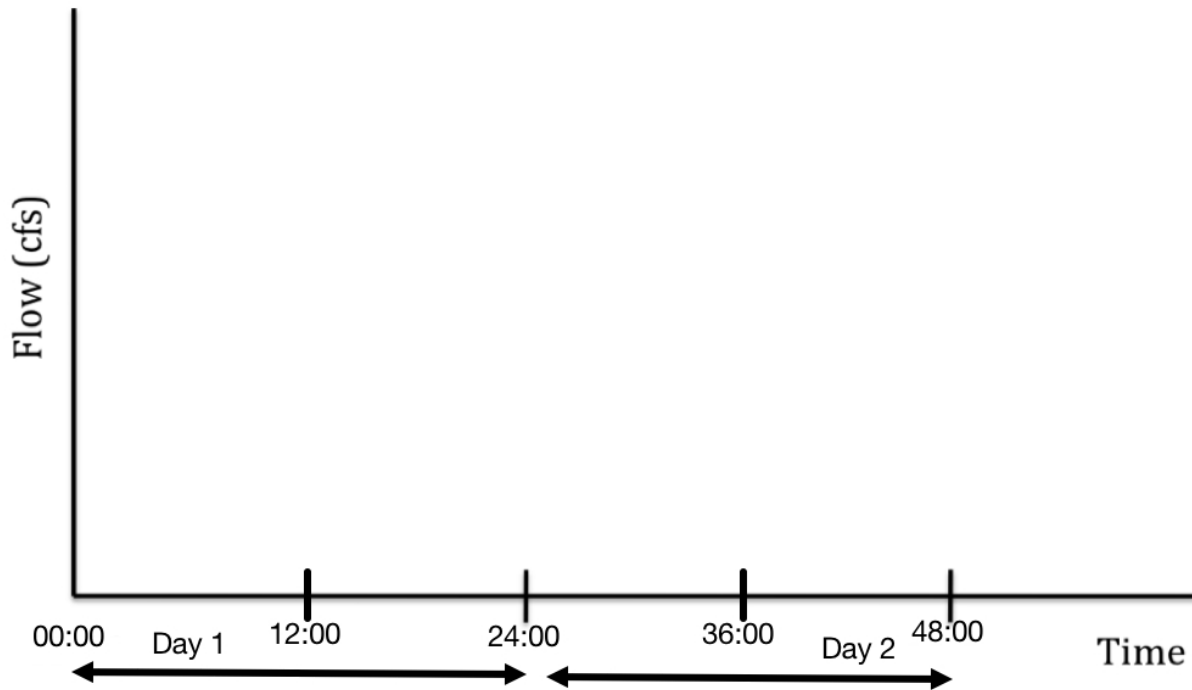2. Sketch the output **hydrograph** from HEC-HMS for your sub-basin.

Figure 2: Small Watershed HMS Model Output (Sketch)

3. To add a reservoir we will need to add storage-discharge information. Such data (a storage-discharge function) are **entered** in which of the following components?

   A) A gage in the time-series manager component.

   B) A time-window in the control specifications component.

   C) A process in the sub-basin component.

   D) A function in the paired-data manager component.

Add a detention basin (reservoir) at the outlet of the small watershed that has the properties listed below. The HEC-HMS configuration should look similar to Figure 3.

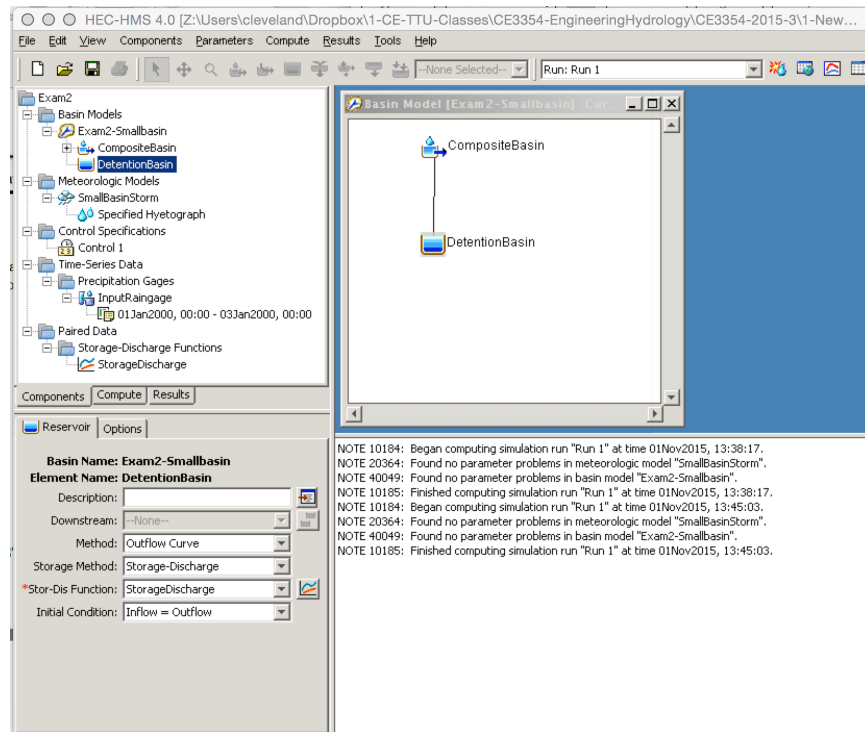| Storage (Acre-Feet)	Discharge (cfs)
0.0	0.00
0.5	1.50
1.0	2.25
1.5	2.75
2.0	3.26
2.5	7.00
3.0	18.00
3.5	30.00
4.0	90.00

Figure 3: Configuration of Small Watershed HMS Model with a Detention Basin (Reservoir)

4. Sketch the output **hydrograph** from HEC-HMS for your detention pond (outflow from the basin after the sub-basin hyrdograph is routed through the detention pond).
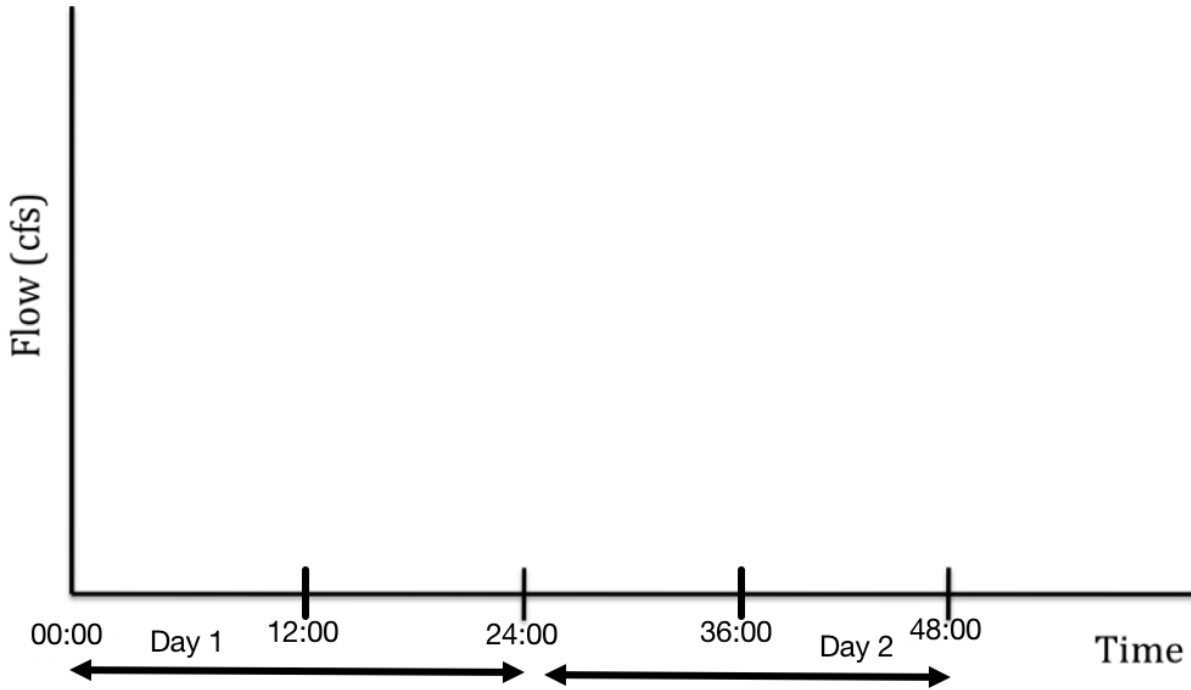

Figure 4: Small Watershed HMS Model Output (Sketch)