

**CE 3354 Engineering Hydrology**  
**Exercise Set 2**

**Exercises**

1. Figure ?? is a map of Harden Branch Creek to be used for watershed delineation. The Assessment Point on the map, coincides with the red circle below on Figure ??, which is centered on the bridge west of Eden Texas. This watershed is the subject of the semester design project.

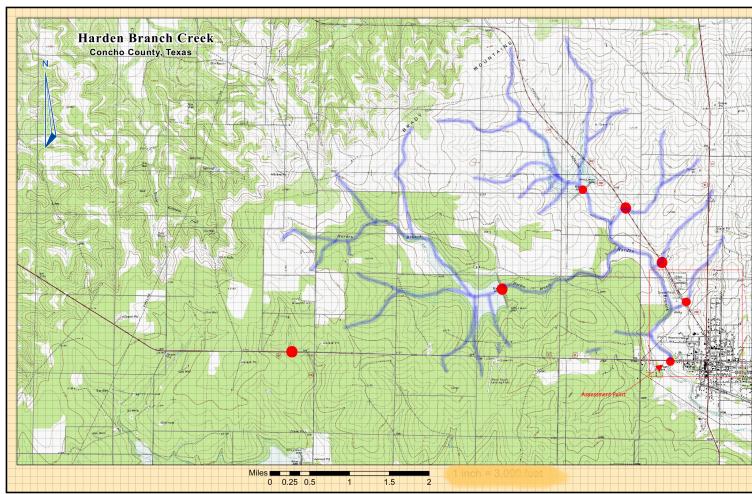


Figure 1: Texas Training Watershed Map (annotated)

Using a GIS (i.e. QGIS) locate the “Assessment Point” in the GIS and determine the latitude and longitude of the bridge in DMS (degrees-minutes-seconds) coordinates. Screen capture the GIS to demonstrate the determination of the coordinates.<sup>1</sup>

2. Assuming that all water in the oceans is involved in the hydrologic cycle, estimate the average residence time of ocean water. [Problem 1.1.1 in Chow, Maidment, and Mays]
3. Assuming that all surface runoff to the oceans comes from rivers, estimate the average residence time of water in rivers. [Problem 1.1.2 in Chow, Maidment, and Mays]
4. The equation  $k \frac{dQ}{dt} + Q(t) = I(t)$  has been used to describe the response of streamflow to a constant rate of precipitation continuing indefinitely on a watershed. For this problem, let  $I(t) = 1$  for  $t > 0$  and  $Q(t) = 0$  for  $t = 0$ . Plot values of  $I(t)$  and  $Q(t)$  over a 10-hour period if  $k = 2$ . [Problem 1.3.2 in Chow, Maidment, and Mays]<sup>2</sup>

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<sup>1</sup>The DMS coordinates are for this assignment only; you will find it far more useful to use a psuedo-Mercator projection. Avoid the temptation to use Google Earth for the coordinates.

<sup>2</sup>You will need to solve the differential equation

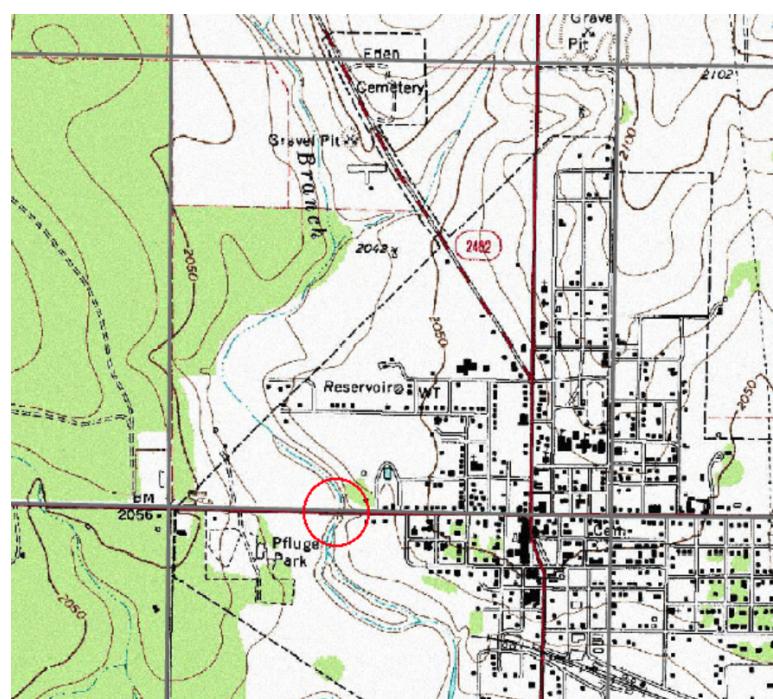


Figure 2: Close-up of map West of Eden, Texas

5. sdlf;aj;’sdfj’