ES302 Quantitative Diagnostic Skills Assessment **Spring 2020**

ES302 includes a diverse group of WOU students from a variety of academic backgrounds across campus. To start things off, students are instructed to complete a low-stakes, no grade Diagnostic Skills Assessment for the instructor to get a snapshot of the group, and to help with designing the course for the term, the goal of which is to maximize student success.

The objectives of this exercise include:

(1) A low-stake, no grade, pre-test assessment of existing student knowledge and skills related to a variety of topics associated with the class,
(2) An evaluation of existing mathematical and algebraic problem solving skills, to assist the instructor with targeted skill development,
(3) An evaluation of technology skills related to remote learning, including hardware / software operation, and basic remote facilities available for students to work independently away from campus laboratories.

Instructions:

(1) Print out the diagnostic skills assessment.
(2) Include your name and answer the questions and problems in the spaces provided below.
(3) Scan your completed document, save as an Acrobat PDF file, and upload to Moodle using the appropriate assignment tool located in the Week 1 topic block.
(4) Use the following file naming convention for your PDF file: *lastname*_ES302_Diagnostic.pdf

NOTE: you may use available "open-book" internet resources to solve the Part 1. quantitative style problems. This assessment is ungraded, the goal is for the instructor to evaluate your current / existing knowledge base, so that I can properly scale the course in terms of content and background materials that I need to cover. The goal here is to get a snapshot of where you are at present, not to get the correct answer by internet searching. That is a valuable skill in some cases, but will not be helpful for me to properly design the class content and maximize student success for all participants.

ES302 Environmental Geology **Diagnostic Exam** **NAME_____**

Open Book – Quantitative Style Problem Solving. **SHOW ALL OF YOUR MATH WORK**.

1. A cylindrical sample of rock has a length of 20 cm and a diameter of 4.5 cm. The mass of the sample is 3500 g.

   A. Draw a sketch and show dimensions

   B. Determine the volume of the same in cubic centimeters and cubic meters. Show all of your math work.

   C. Given that the acceleration due to gravity g = 9.8 m^3/sec, determine the unit weight of the rock mass in N/m^3. (newtons per cubic meter). Show all of your math work.

2. A 25.6 m^3 block of rock has a porosity of 23.45%. What is the volume of ground water that could be stored in this rock material. Answer in cubic meters and gallons. Show all of your math work.

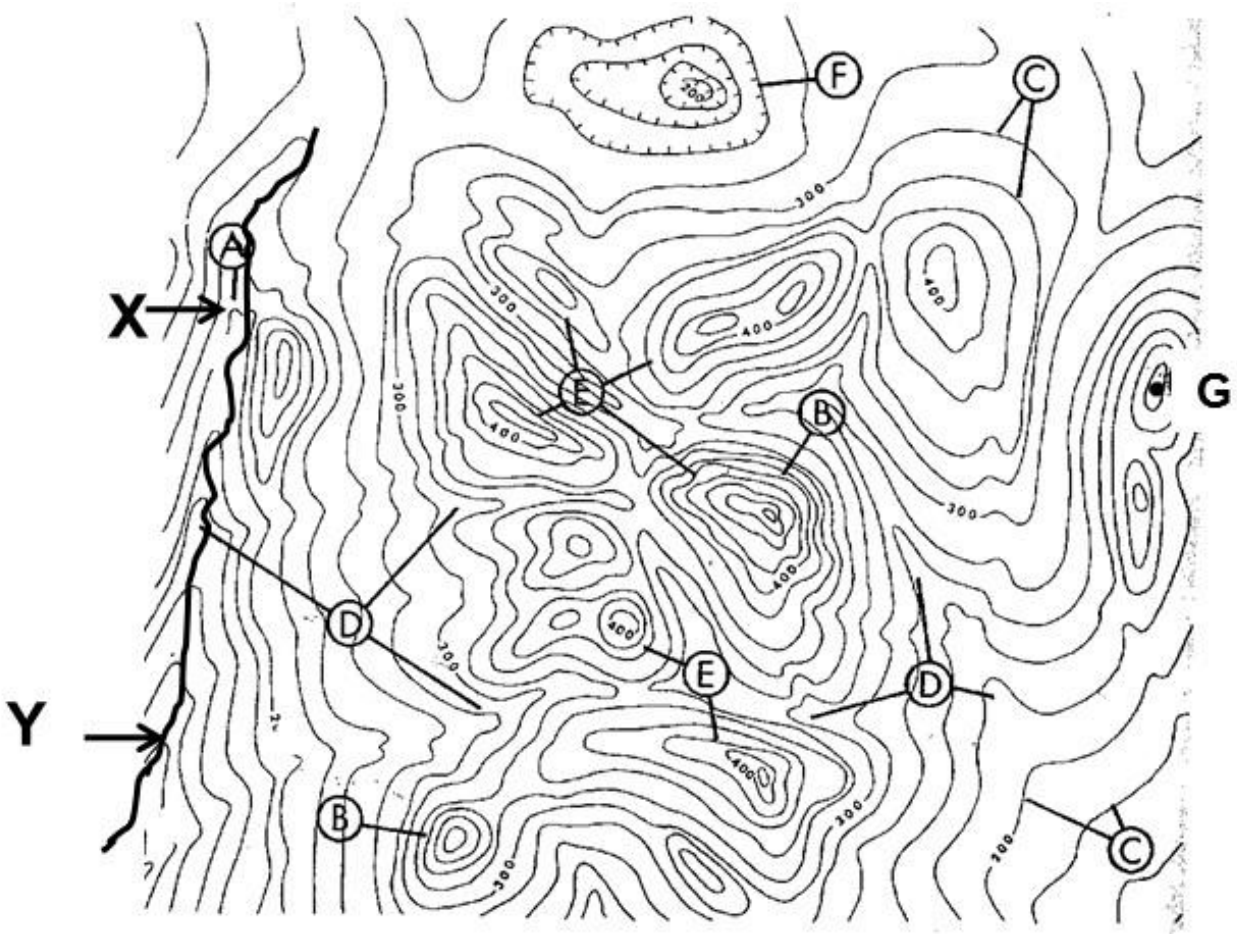
3. A rectangular shaped swimming pool has a surface area of 5000 square feet, and a uniform depth of 10 ft.

   A. Draw a sketch with dimensions labeled.

   B. Determine the total maximum volume of water stored in the swimming pool in cubic meters and gallons. Show all of your math work.

   C. A pump has a flow rate of 5 gal/min, how long would it take to pump out all the water in the pool? Show all of your math work, answer in hours and minutes. (5 pts)

4. Examine the topographic map below, and answer the questions that follow. Show all of your math work, and answer in the slots provided to the left of the item letter.



Elevations in feet

_____A. What is the contour interval of the map?

_____B. Which direction is stream "A" flowing, assume standard map orientation relative to north.

_____ C. If one inch on the map is equivalent to 2000 feet on the ground, determine the fractional scale of the map in standard ratio. Show all of your math work.

_____ D. what is the elevation of point "Y" in feet

_____ E. Using a protractor, determine the azimuth compass direction traveling from Pt. G to Pt. Y

_____ F. True or False: the topographic features labeled "D" are upland ridges. Explain your answer.

_____ G. True or False: if you were standing at the circle inscribing the letter "C", you would be able to visually see Pt. "F" from your vantage point. Explain your answer.

_____ 5. If a map has a scale of 1:24000 then 5 inches on the map equals:
A. 100 ft B. 100 Miles C. 24000 inches D. 10,000 Ft E. None

_____ 6. You are floating in a raft on a river. At point A you are at 5373 feet elevation, at point B you are at 2457 feet elevation. The two points are separated by 3.6 miles. What is the gradient of the river between the two points in ft/ft? (hint: 1 mi = 5280 ft)
A. 810 B. 1023 C. 0.15 D. 0.789 E. None of the above

_____7. You are hypothetically driving in your car and check your GPS to determine that you are located at the following Longitude and Latitude coordinates:
Longitude -123^{o} 24' 13" W +Latitude 45^{o} 13' 45" N
Convert you location from degrees-minutes-second format, to decimal degrees. Show all of your math work in the space below, place your answer in the slot next to the question no.

_____8. What state are you located in given the position in Question 7 above?

_____9. You are hiking in central Oregon. From your starting position at point A, you head due north for 3 miles, turn to your right and head due east for another 3 miles. What is the overall net compass azimuth bearing that you traveled from point A to point B. Draw a sketch below with north arrow, and show all of your math work, place your answer in the slot next to the question no.

_____10. Continuing on your journey from point B in question 9, you head due south for 2 miles, turn right again, and head due west for 2 miles ending at point C. What is the overall net compass azimuth bearing that you traveled from point B to point C. Draw a sketch below with north arrow, and show all of your math work, place your answer in the slot next to the question no.

_____ 11. True or False: on you long hike in Questions 9 and 10, your final destination at point C, was exactly in the same location as the starting point A. Draw a sketch showing the spatial relationships to justify your answer.

_____12. For objects in motion, the equation for velocity is $V = \frac{d}{t}$
Where d = distance traveled, and t = time of travel. On a vacation trip, you plan to drive 643 miles to reach your destination, at an average velocity of 100 km / hr, calculate your estimated total driving time (with no stops). Show all of your math work.