

SIO 15 (FQ 2024) – Homework #5 Due November 5, 2024

Maximum score: 20 points + 1 bonus point

- 1 penalty point for late submission (more than 30 min past due date)

Divide by 4 for contribution to total cumulative

- 1) Watch the homework 4 video on the class website!**
- 2) Add your full name (your family/last name first) to the top on each page.**
- 3) Provide only answers (not the questions!) in the document you submit.**
- 4) Label each of your answers (1a, 1b, 1c etc.), starting a new line for each of your answers.**
- 5) Provide short answers. Shorter is better! No full sentences required. Definitely no long answers. Points may be subtracted for answers that are too long/answers given that are not relevant to the question (including cut-and-paste jobs of entire sections from the class website).**
- 6) include appropriate units where needed (not just numbers)**
- 7) Hand-written ok as long as the handwriting is easily readable.**
- 8) Submit a single pdf to Gradescope. Only submit a high-quality pdf. Cell phone photo scans are not ok! Instead, use a professional app, such as Turboscan.**
- 9) Important!!!!!! After you uploaded your pdf but before hitting the submit button, please identify on which page each of your answers to problems 1 - 10 are. Only when this is completed, hit the submit button.**

Topics 14 – 16

- 1) a) Video 9d shows flood frequency curves for increasing urbanization. Compare the discharge of a 2-year flood in an unurbanized area, a 20-20 area (20% is sewered/20% is impervious), a 50-50 area, and an 80-60 area. Include units! (0.5 pt)
b) What is the probability of a 100-year flood to occur in any given 1-year interval? (0.5 pt)
c) Explain why the probability for a 100-year flood in a given 100-year interval is less than 100%. (0.5 pt)
d) Given the flood frequency curves for the Pedernales and the Navasota rivers in Texas, estimate the discharge of their respective 100-year floods. (include units! allowed error margin:10%) (0.5 pt)
(2 points total)

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- 2) a) When did the Banqiao dam in China fail and what natural cause contributed to the failure? (0.5 pt)
b) The epic 1927 flood of the lower Mississippi inundated 70,000 km². Compare the size of these two floods. Provide a factor, not a difference! (0.5 pt)
c) Compare the size of the Oroville reservoir with that of the modern Banqiao reservoir? Provide a factor, not a difference! (0.5 pt)
d) Go to Wikipedia and find the Oroville dam. A $M_L=5.7$ earthquake in 1975 is thought to be induced seismicity. What are the two possible causes for this quake? (0.5 pt)
(2 points total)
- 3) Go to Wikipedia and search for the St. Francis Dam
a) When was this dam built? About how long did construction last? (0.5 pt)
b) For how long was this dam in operation? (0.5 pt)
c) Why did the dam fail? How many people were killed? (0.5 pt)
d) Compared to other disasters in California history, where does this dam failure place it terms of lives lost? (0.5 pt)
(2 points total)
- 4) a) What are the two main contributing gases to Earth's atmosphere? Include numbers. (0.5 pt)
b) Which three gases contribute most to Earth's natural greenhouse? Also provide numbers. (0.5 pt)
c) Provide the names of 4 countries in South America that are in the southern hemisphere. (0.25 pt)
d) Provide the names of 4 countries in Africa that are in the southern hemisphere. (0.25 pt)
e) Is Ecuador located in the southern or northern hemisphere? (0.25 pt)
f) Provide 1 country each in South America and Africa that is in the northern hemisphere. (0.25 pt)
(2 points total)
- 5) a) Describe the position of the northern and southern hemispheres with respect to the sun during the northern summer solstice (June 21). (0.5 pt)
b) About how long is the day and night during the fall equinox in Mexico City? (0.5 pt)
c) How about Perth, W. Australia? (0.5 pt)
d) At which time(s) during the year is the sun overhead at noon at the equator? (0.5 pt)
e) If at all, when is the sun overhead at noon at 23.5°N? (0.5 pt)
(2.5 points total)
- 6) For this problem, use the lecture slide(s) that show the Santa Ana in October 2023.
a) During the Santa Ana weather condition, what happens to the relative humidity, compared to normal days? Provide typical numbers for both. Include units! (0.5 pt)
b) What happens to daily high temperatures? Provide typical numbers with units. (0.5 pt)
c) What happens to the difference between day and night time temperatures? (0.5 pt)
d) Explain why the change in this difference occurs. (0.5 pt)
(2 points total)

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- 7) a) What happens to air that rises adiabatically, in terms of volume and temperature? (0.5 pt)
b) Which process typically terminates this type of adiabatic change? (0.5 pt)
c) What kind of pressure is left at the surface when air rises? (0.5 pt)
d) At which latitudes would we find the trade winds? (0.25 pt)
e) From which direction do the trade winds blow in the northern hemisphere? Be as precise as possible. (0.25 pt)
(2 points total)

8) News clip 23 January 2024:

- a) Outside which elementary school did waters rise up to 3 feet? (0.5 pt)
b) During which 3-hour window did National City get how many inches of rain? (0.5 pt)
c) The airport received 2.7 inches of rain between midnight and 4 p.m..
In terms of rainfall on any day in January in San Diego, where does this amount of rainfall place, over which time span of record-keeping? (0.5 pt)
d) Over a three-day period ending at 3 p.m. on Monday, how much rain had fallen at S.D. International airport, Point Loma, Fashion Valley, Kearny Mesa?
(provide four numbers and include units for at least one of them) (0.5 pt)
(2 points total)

9) Find Lake Mead in Google Earth

- a) On which river is the reservoir located? (0.5 pt)
b) Follow the lake to the west until you encounter the dam that keeps the water in the lake.
What is the name of this dam? (0.5 pt)
c) Find this dam in Wikipedia. When was this dam opened? How long did construction last? (0.5 pt)
d) By how much has electricity generation on the dam declined between 2000 and 2014? (0.25 pt)
e) What is the ultimate cause for this decline? (0.25 pt)
(2 points total)

10) Find the school under 8a in Google Earth

- a) What is the street address and zip code of this school? (0.5 pt)
b) Zoom out until you see a neighborhood name. What is this name? (0.5 pt)
c) Which neighborhood is to the immediate north? What about the next neighborhood north of that? (0.5 pt)
d) Find Beta St between the neighborhood under 10b and the first under 10c. This street was particularly badly affected by the 23 January San Diego flood. Measure its length from the merge with Birch St to its end. include units (error margin: 20 m) 0.5 pt
e) Which city is to the immediate south of the 10b neighborhood? What city is next (farther south).
Hint: the boundary between the two cities is SR 54. (0.5 pt)
(2.5 points total)