

The following written homework problems are due at 6pm on Gradescope, the night before your class. You also have a WebWork assignment due at 11pm two days before your class.

- (6.1) Determine whether $\int_0^1 \frac{1}{3y-2} dy$ is convergent or divergent. If it is convergent, evaluate it.
- (6.2) Use the Comparison Theorem to determine whether $\int_4^\infty \frac{5+e^{-x}}{x} dx$ is convergent or divergent.
- (6.3) Use the Comparison Theorem to determine whether $\int_0^{\pi/2} \sec^3 x dx$ is convergent or divergent.
- (6.4) **Professional Problem.**

Decide whether each of the following statements is true or false. If a statement is true, prove it. If a statement is false, give a specific counterexample.

- (a) If $\int_1^\infty f(x) dx$ and $\int_1^\infty g(x) dx$ both converge, then $\int_1^\infty f(x) + g(x) dx$ also converges.
- (b) If $\int_1^\infty f(x) + g(x) dx$ converges, then $\int_1^\infty f(x) dx$ and $\int_1^\infty g(x) dx$ both must converge.
- (c) If $\int_1^\infty f(x) dx$ diverges, then $\int_1^\infty (f(x))^2 dx$ diverges.

As always, refer to the “Professional Problem information” handout to create a *professionally written* solution. This week, you should especially focus on:

Explanation: Justify any theorem which you use by showing that you have checked its hypotheses. Explain why any counterexample used is a *valid* counterexample. Do not include too much explanation; you could say whether an integral converges or diverges by citing a *p*-test, for example, instead of working out the limit definition of an improper integral.

Reward for reading this: Only one of these statements is true.

Organization & Structure: Your solution to each part can be very short! Rewrite, revise, and hand in a beautiful final result. Any proofs can fit within a quarter or half of a page. Any counterexamples can be stated in a few sentences. If your solutions are longer, you should edit them to make them more concise.

You should have questions!

When you do, here's what to do:

1. Post your question on Canvas.
2. Email *all* of the instructors with your question.
3. Write your solution (even if you're unsure about it) and bring it to the study session. Ask an instructor specific questions about it.

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