

Worcester Polytechnic Institute

Fall 2020 - A Term

Department of Mathematical Sciences

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MA 1023

Calculus III

Conference 1 – Ideas

*Covers material from Lecture 4-6
& Active Learning 2*

1. Calculate the following improper integrals:

a) $\int_1^{\infty} \frac{(\ln(w))^2}{w} dw$

b) $\int_{-1}^{\infty} \frac{1}{|z+2|^5} dz$

2. Do the following integrals converge or diverge? Explain your answer carefully. Note that you do not have to calculate the integrals explicitly for that.

a) $\int_1^{\infty} \frac{(\arctan(x))^3}{x^2} dx$

b) $\int_1^{\infty} \frac{2 + \cos(y)}{\sqrt[3]{y}} dy$

3. For which values of p does the following integral converge?

$$\int_e^{\infty} \frac{1}{x(\ln(x))^p} dx$$

4. Explain what it means to say that

$$\int_{-\infty}^3 f(x) dx, \quad f(x) \geq 0.$$

diverges. Your answer might be a mix of text, graphics and mathematical expressions.

5. Let $P_n(x)$ be a n -th degree polynomial. What can we conclude about the improper integral

$$\int_1^{\infty} \frac{P_n(x)}{5x^n + 1} dx$$