

Math 231 Exam I

Sections 6.1-6.4, 6.6, 7.1

Problem 1. .

a) Write out the general form of the partial fractions decomposition of the given function. (Note that you do **NOT** need to solve for the coefficients A , B , etc.)

$$\frac{1}{(x-2)^3(x^2+4)^2x^4}$$

b) Calculate the following definite integral.

$$\int_3^4 \frac{1}{x^2 - 2x} dx$$

Problem 2. Calculate the following definite integral.

$$\int_0^{\pi/2} e^x \sin x \, dx$$

Problem 3. Calculate the following anti-derivative.

$$\int \frac{1}{x^2 \sqrt{4x^2 - 16}} dx$$

Problem 4. State whether the following integrals converge or diverge and explain why. (Answers with no explanation will earn no points.)

a) $\int_1^{\infty} \frac{1}{x^2 + 2} dx$

b) $\int_{-1}^1 \frac{1}{x^4} dx$

$$\int_0^{\infty} \sin^2 x dx$$

Problem 5. Calculate the following anti-derivative.

$$\int \sec^4 x \tan^{17} x \, dx$$

Problem 6. *In a certain dorm room sink it is noted that there is a colony of 100 bacteria at 7am. By 10am the colony has grown to 200.*

a) *Write out an appropriate differential equation with initial conditions for this situation.*

b) *Find the growth constant k for this colony of bacteria.*

c) *At what time will there be 6400 bacteria in the colony?*