Math 1b Sum. 2019

Exam 2 Review **Name:**

Determine whether the following integrals converge or diverge using any method of your liking,

(1) $\displaystyle\int_2^\infty \frac{1}{x\log(x^2)}\,dx$

(2) $\displaystyle\int_{-\infty}^\infty \frac{\sin^2 x}{x^2}\,dx$

(3) $\displaystyle\int_3^\infty \frac{x^2(x+\sqrt{x})}{(x+1)(x^2-1)(2x+3)}\,dx$

Compute the length of the following curves between the given bounds.

(1) $x = 2 + (y-1)^2, \quad 2 \leq y \leq 5.$

(2) $y = (3x+2)^2, \quad 1 \leq x \leq 4.$

(3) $y = \frac{1}{4}(e^{2x} + e^{-2x}), \quad 0 \leq x \leq 1.$

Determine whether the following sequences converge or diverge,

(1) $a_n = \dfrac{5n \cdot n!}{(n+2)!}$

(2) $b_n = (-1)^{n+1} \dfrac{2+3n^2}{5n^2+2n}$

(3) $c_n = \dfrac{\sin\left(\frac{1}{n}\right)}{n}$

Consider the following questions about sequences

(1) Let $\{a_n\}$ be an alternating sequence, in other words $a_n = (-1)^n b_n$ where $\{b_n\}$ is a sequence of entirely positive or entirely negative numbers. If $\{a_n\}$ converges, what is $\lim_{n\to\infty} a_n$?

(2) (a) Give an example of a sequence that is bounded, but not monotonic. (b) Given an example of a sequence that is monotonic, but not bounded.

(3) Let $\{x_n\}$ be a convergent sequence and let $f(x)$ be an everywhere continuous function. Does the sequence $f(x_n)$ converge?

Consider the following questions regarding series,

(1) Compute the first 5 terms of the sequence of partial sums for the series

$$\sum_{n=1}^{\infty} \frac{(-1)^n}{2^n n^2}$$

(2) Determine whether the following series converges. Be sure to explain your reasoning.

$$\sum_{n=1}^{\infty} \left[3\left(\frac{4}{7}\right)^{n-1} + 2\left(\frac{4}{3}\right)^{n-1} \right]$$

(3) Determine whether the following series converges by using the integral test,

$$\sum_{n=1}^{\infty} \frac{1}{n^2+1}$$