

Second 1-Hour Exam

(20 pts) **1.** Calculate the arc length of the graph of

$$f(x) = \sqrt{9 - x^2}$$

over $[0, 3]$.

(20 pts) **2.** Determine the limit of the sequence

$$a_n = \frac{2n^2 + (0.3)^n}{3n^2 - n + 1}$$

(20 pts) **3.** Determine whether the improper integral converges, and if so, evaluate it:

(a)

$$\int_1^{\infty} x e^{-x} dx$$

(b)

$$\int_1^2 \frac{x}{x-1} dx$$

(20 pts) **4.** State whether the given series is convergent or not. If convergent find its sum.

(a)

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

(b)

$$\sum_{n=1}^{\infty} \frac{3^n}{2^n}$$

(20 pts) **5.** Find the values of x for which the following series converges

$$\sum_{n=0}^{\infty} \frac{3^n x^n}{n}$$