

## Math 143 Quiz 1

Names: \_\_\_\_\_

1. Find the degree 3 Taylor poly at  $x = 0$  for a function that satisfies  $f(0) = 1$  and  $f'(x) = f(x)^2 + x$ .

2. How big should  $n$  be to ensure that the error in the approximation

$$e^{-1} \approx 1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \cdots + \frac{(-1)^n}{n!}$$

is at most  $1/100$ ?

**3.** The degree  $n$  Taylor polynomial for  $f(x)$  at  $x = a$  is

$$y = a_0 + a_1(x - a)^1 + a_2(x - a)^2 + \cdots + a_n(x - a)^n$$

where  $f(x)$  and  $y$  have the same  $k^{\text{th}}$  derivative at  $x = a$  for  $k = 0, \dots, n$ . Find a formula for  $a_k$ .

**4.** Find the degree  $n$  Taylor polynomial for  $\ln x$  at  $x = 1$ . (Write the answer using  $\Sigma$  notation.)

**5 (Bonus).** (Attempt on a separate page only when all other exercises are perfect.)

Find the Taylor series at  $x = 0$  for  $(1 + x)^r$  where  $r$  is arbitrary. (Write the answer using  $\Sigma$  notation.)