Math 163
Fall 2023
Assessment 7
Dusty Wilson

Name: _____

*Would you rather have unlimited bacon and
no video games or unlimited video games
and no video games?*
Matt's question to Respawn Index
circa 2014

No work = no credit

1. Warm-ups

   (a) (1 point) $\sum_{n=0}^{\infty} \frac{x^n}{n!}$

   (b) (1 point) $\sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{(2n)!}$

   (c) (1 point) $\sum_{n=0}^{\infty} 3x^n$

2. (1 point) How would you respond to Matt's "Would you rather" question (above) Answer using complete English sentences.

3. (8 points) Find a power series expansion for $\frac{7x}{8+x^2}$ AND where the series converges.

4. (2 points) Simplify (a.) $\frac{1000!}{999!}$ and (b.) $\frac{n}{n!}$.

5. (4 points) Write $1 - 2x + 3x^2 - 4x^3 + 5x^4 - \dots$ using sigma/summation notation.

6. (8 points) Use a power series to approximate the definite integral $\int_0^{0.3} \frac{dx}{1+x^4}$ to six decimal places. Note: This requires using the first two non-zero terms of the series.

7. (4 points) Suppose you want to find the coefficients of the power series $\sum_{n=0}^{\infty} c_n x^n$. You know that $c_0 = 1$, $c_1 = 1$ and $c_n = c_{n-2} + c_{n-1}$ for $n \geq 2$. Write out the the first 10 terms of the series beginning with $1 + 1x + \ldots$