Math 107H Fall '17 **Exam 2**

Print Your Name Legibly: _____ **Score:** _____

Instructions: You must show supporting work to receive full and partial credits. No text book, notes, formula sheets are allowed. Graphic calculator is allowed.

1(15 pts) Find the sum of the following:

(a) $\sum_{n=1}^{\infty}(-1)^{n-1}\frac{2^n}{3^{n+1}}$

(b) $\sum_{n=1}^{\infty}\left[\arcsin\left(\frac{1}{n}\right)-\arcsin\left(\frac{1}{n+1}\right)\right]$

2(10 pts) Let $f(x)=\frac{1}{\sqrt{1-x}}$. Find the function's Taylor polynomial $P_2(x)$ at $a=0$.

(*Page 1. Continue on Next Page ...*)

3(10 pts) Use Taylor's series to evaluate the limit $\lim_{x\to 0} \dfrac{\cos(2x)-1}{x^2}$.

4(10 pts) Let $f(x) = \dfrac{x^2}{1-2x}$. Use f's Taylor series to find the 2017th derivative $f^{(2017)}(0)$.

5(10 pts) Find the sum of the series $\sum_{n=1}^{\infty} (-1)^{n-1} \dfrac{2^n}{n!}$.

(*Page 2. Continue on Next Page ...*)

6(15 pts) Determine if the following series converge absolutely, or conditionally, or diverge.

(a) $\sum_{n=1}^{\infty}[(-1)^n + 1]$

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

7(10 pts) An anchor weighing 100 lb i n water is attached to a chain weighing 3 lb/ft in water. Find the work done to haul the anchor and chain to the surface of the water from a depth of 25 ft.

(*Page 3. Continue on Next Page ...*)

8(20 pts) Determine the following for the power series $\sum_{n=0}^{\infty} \frac{(x+1)^n}{3^n\sqrt{n+1}}$: a) The center and radius of convergence, b) interval of absolute convergence, c) interval of convergence, and d) intervals of divergence.

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2 Bonus Points: True or False: The State Flower of Nebraska is the dandelion. (... The End)