Homework 12 - Math 142 **Name:** ________________________

1. How many terms of the alternating series $1 - \frac{1}{4} + \frac{1}{9} - \frac{1}{16} + \frac{1}{25} - \ldots$ would you need in order to estimate the sum with an error of less than 0.01? Use a calculator or Desmos to find the sum of the series to that level of accuracy.

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2. Use Desmos to approximate the sum $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n \pi^{2n}}{36^n\,(2n)!}$ by computing the partial sum up to the $n = 4$ term. Include an estimate for how much error there is in this approximation.

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3. Find a Maclaurin series for each function below by starting with the Maclaurin series formulas on the Formula Sheet.

   (a) $\cos(\sqrt{x})$.

   (b) $\dfrac{\sin x}{x}$.

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4. Find an infinite series for the integral $\displaystyle\int_0^{\sqrt{\pi}} \sin(x^2)\,dx$.

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5. Find the radius and interval of convergence for the power series $\sum_{n=1}^{\infty} \frac{n^2(x-5)^n}{6^n}$.

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6. Find the radius and interval of convergence for the power series $\sum_{n=0}^{\infty} \frac{(-1)^n 3^n}{n!} x^n$.

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7. Identify each series below as alternating, geometric, or p-series. Note: more than one description might apply so circle or list all that are appropriate. Then determine whether the series converges or diverges.

	Series	Type	Convergence
(a)	$\sum_{n=0}^{\infty} \frac{(-1)^n}{3^n}$	Alternating Geometric p-Series	Converges Diverges
(b)	$\sum_{n=2}^{\infty} (-1)^n \left(\frac{n^3}{n+1}\right)$	Alternating Geometric p-Series	Converges Diverges
(c)	$1 + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{4}} + \frac{1}{\sqrt{5}} + ...$	Alternating Geometric p-Series	Converges Diverges

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