TAYLOR SERIES Name______________________________

USE WELL-KNOWN SERIES TO ANSWER THE FOLLOWING.

1. Find $3+\frac{27}{3!}+\frac{243}{5!}+\frac{2187}{7!}+....$

2. Find $x^2-\frac{x^4}{3!}+\frac{x^6}{5!}-\frac{x^8}{7!}+....$

3. Find $\sum_{k=1}^{\infty}\frac{(-1)^{k+1}x^k}{k}$.

4. Use series to find $f^{(5)}(0)$ and $f^{(6)}(0)$ for $f(x)=\frac{x}{1-x^2}$.

5. Use the values in the table below to find the limits. Show work to justify your answer. In other words, what does this have to do with Taylor polynomials?

A. $\lim_{x\to 2}\frac{f(x)}{h(x)}$ and B. $\lim_{x\to 2}\frac{f(x)}{g(x)}$.

	Function Value at $x=2$	First Derivative Value at $x=2$	Second Derivative Value at $x=2$
$f(x)$	0	0	3
$g(x)$	0	22	5
$h(x)$	0	0	7

6. Use the series for $\ln(1-x)$ and differentiation to find a series for $\frac{1}{1-x}$.

7. Use the series for $\frac{1}{x^2+1}$ and integration to find a series for $\arctan x$.

8. Find a series for $\int_0^x te^t\,dt$.

9. In this problem you will evaluate/ approximate $\int_0^1\sqrt{2-x^2}\,dx$ in four different ways.

A. Use the first two nonzero terms of an appropriate series to get an approximation.
B. Use Simpson's rule with $n=20$ to get an approximation.
C. Break up the region into a triangle and a part of a circle, then use geometry to get an exact value.
D. Use the integration tables to get an exact value.