

**Manipulating Taylor and Maclaurin Series Problems****Name:***AP Calculus BC*

1) Given  $f(x) = \sum_{n=0}^{\infty} \left(\frac{x}{2}\right)^n$ , find  $f'(x)$  and  $\int f(x) dx$  and the interval of convergence for all three power series.

2) Generate a power series for  $\sin\left(\frac{1}{2}x\right)$ , centered at 0, including the general term in two different ways.

3) Using their Taylor series, show that a)  $\frac{d}{dx}(e^x) = e^x$  and b) if  $F(x) = \int e^x dx$  with  $F(0) = 1$ , then  $F(x) = e^x$ .

Generate power series for the following, centered at 0, using the table. Include the general term.

4)  $f(x) = \cos(\sqrt{2}x)$

5)  $f(x) = \sin x^3$

6)  $f(x) = e^{-x}$

7)  $f(x) = x^2 e^x$

8)  $f(x) = \frac{\tan^{-1} x}{x}$

9.  $f(x) = x \cos(x^{3/2})$