AP Calculus BC – Unit 7 Part 2 Extra Practice

7.9 – Extra Practice

State where the power series is centered.

#9b. $\sum_{n=1}^{\infty}(-1)^n \frac{2n-1}{2^n n!}(x)^n$

#10b. $\sum_{n=0}^{\infty}(-1)^n \frac{1}{(2n)!}(x-\pi)^{2n}$

Find the radius of convergence of the power series.

#11b. $\sum_{n=0}^{\infty}(3x)^n$

#12b. $\sum_{n=0}^{\infty}(-1)^n \frac{x^n}{5^n}$

#13b. $\sum_{n=0}^{\infty}\frac{(2n)!x^{2n}}{n!}$

Find the interval of convergence of the power series (you must check each endpoint).

#14b. $\sum_{n=0}^{\infty} \frac{1}{(n+1)4^{n+1}}(x-3)^{n+1}$

Find the interval of convergence of the power series (you must check each endpoint).

#15b. $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{1}{n2^n}(x-2)^n$

#16b. (no additional problem – please see the lesson notes for examples of how to work #16).

7.10 – Extra Practice

Find the geometric power series for the function, centered at 0.

#5b. $f\left(x\right)=\dfrac{2}{5-x}$

#6b. $f\left(x\right)=\dfrac{1}{2+x}$

Find the geometric power series for the function, centered at *c*, and determine the interval of convergence.

#7b. $f\left(x\right)=\dfrac{2}{6-x} \quad at \;\; c=-2$

#8b. $f\left(x\right)=\dfrac{1}{1-5x} \quad at \;\; c=0$

Find the geometric power series for the function, centered at *c*, and determine the interval of convergence.

#9b. $f(x)=\frac{6}{4-x^2} \quad at \quad c=0$

Re-work the problem in #9b, using the fact that the denominator is factorable to re-write using Partial Fraction Expansion, then find the geometric power series (combining terms using properties and determine the interval of convergence.

#10b. $f(x)=\frac{6}{4-x^2} \quad at \quad c=0$

Use the fact that the given function is a derivative of another function, find the power series of the other function, then integrate the result to find the power series of the original function.

#11b. $f\left(x\right)=\dfrac{-1}{\left(x+1\right)^{2}}=\dfrac{d}{dx}\left[\dfrac{1}{x+1}\right] \quad at \;\; c=0$

7.11 – Extra Practice

Find the nth Maclaurin polynomial for the given function.

#4b. $f\left(x\right)=e^{-\frac{1}{2}x}, \quad n=4$

#5b. $f\left(x\right)=\cos\left(\pi x\right), \quad n=4$

#6b. $f\left(x\right)=x^{2}e^{-x}, \quad n=4$

Find the nth-degree Maclaurin polynomial for the given function.

#7b. $f\left(x\right)=\dfrac{x}{x+1}, \quad n=4$

Find the nth-degree Taylor polynomial centered at c for the given function.

#8b. $f\left(x\right)=\sqrt[3]{x}, \quad n=3, \quad c=8$

#9b. $f\left(x\right)=x^2\cos\left(x\right), \quad n=2, \quad c=\pi$

Find the nth-degree Taylor Series, centered at c for the given function.

#10b. $f(x) = \frac{1}{1-x}, \quad c = 2$

Write out the terms for a Maclaurin polynomial for the given series, and find an expression for the nth-term. Then use this to write a Maclaurin Series for the function.

#11b. $f(x) = \cos(x)$

7.12 – Extra Practice

Use the binomial series to find the Maclaurin Series for the function.

#4b. $f(x) = \sqrt{1 + x^7}$

Use the list of basic Power Series to find the Maclaurin Series for the function.

#5b. $f(x) = e^{(-3x)}$

#6b. $f(x) = \ln(1 + x^2)$

Use the list of basic Power Series to find the Maclaurin Series for the function.

#7b. $f(x) = \cos(\pi x)$

#8b. $f(x) = \cos^2(x)$

7.13 – Extra Practice

#7. (no matching problem) – hint on part c. Figure out what term this derivative would be a part of and match the coefficient.

Determine the degree of the Maclaurin polynomial required for the error in the approximation of the function at the indicated value to be less than 0.001.

#8b. $f\left(x\right)=\cos\left(x\right),\quad approximate\ f\left(0.1\right)$

Determine the degree of the Taylor polynomial centered at x = 1 required for the error in the approximation of the function at the indicated value to be less than 0.001.

#9b. $f\left(x\right)=\ln\left(x\right),\quad approximate\ f\left(1.25\right)$

#10b. If $\left|f^{(7)}(x)\right| \le 2$, find the Lagrange error bound if a sixth degree Taylor polynomial centered at x = 4 is used to approximate $f(4.7)$. (Assume the series converges for x = 4.)

#11b. Find an upper limit for the error when the Taylor polynomial $T(x)=1-\frac{x^2}{2!}+\frac{x^4}{4!}$ is used to approximate $f(x)=\cos(x)$ at $x=0.3$.