WebAssign
Hw 30 (11.10)(3): Taylor and Maclaurin Series (Homework)

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MA 162 Spring 2012, section 321, Spring 2012
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Current Score : 20 / 20 **Due :** Thursday, April 12 2012 11:55 PM EDT

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1. 3.33/3.33 points | Previous Answers SCalcET7 11.10.025.

Use the binomial series to expand the function as a power series.

$\sqrt[4]{1-x}$

- ( ) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1}(4n-5)^n}{4^n} x^n$
- ( ) $1 + \sum_{n=1}^{\infty} (-1)^{n+1} \frac{3 \cdot 7 \cdots (4n-5)}{4^n \cdot n!} x^n$
- ( ) $1 + \frac{1}{4}x + \sum_{n=2}^{\infty} \frac{3 \cdot 7 \cdots (4n-5)}{n!} x^n$
- (•) $1 - \frac{1}{4}x - \sum_{n=2}^{\infty} \frac{3 \cdot 7 \cdots (4n-5)}{4^n \cdot n!} x^n$
- ( ) $1 - \frac{1}{4}x - \sum_{n=2}^{\infty} \frac{3 \cdot 7 \cdots (4n-5)}{n!} x^n$

State the radius of convergence, R.

$R =$

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2. 3.33/3.33 points | Previous Answers SCalcET7 11.10.027.

Use the binomial series to expand the function as a power series.

$$\frac{5}{(4+x)^3}$$

$$\sum_{n=0}^{\infty}$$

State the radius of convergence R.

$R =$

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3. 3.33/3.33 points | Previous Answers SCalcET7 11.10.028.

Use the binomial series to expand the function as a power series.

$$3\left(1 - \frac{x}{5}\right)^{2/3}$$

- (selected) $3\;\frac{2}{5}x - \frac{1}{6}\sum_{n=2}^{\infty} \frac{1 \cdot 4 \cdot 7 \cdot \cdots \cdot (3n-5)}{3^n n!}\left(\frac{x}{5}\right)^n$
- $3 - \frac{3}{6}\sum_{n=1}^{\infty} \frac{3 \cdot 5 \cdot 7 \cdot \cdots \cdot (2n+1)}{3^n n!}\left(\frac{x}{5}\right)^n$
- $\frac{2}{3}\sum_{n=0}^{\infty} \frac{2 \cdot 4 \cdot 6 \cdot \cdots \cdot (2n+2)}{3^n n!}\left(\frac{x}{5}\right)^n$
- $3\;\frac{2}{5}x + 6\sum_{n=2}^{\infty} (-1)^n\, \frac{2 \cdot 1 \cdot 5 \cdot 8 \cdot \cdots \cdot (3n-4)}{3^n n!}\left(\frac{x}{5}\right)^n$
- $3\;\frac{2}{5}x - \frac{1}{6}\sum_{n=2}^{\infty} \frac{1 \cdot 3 \cdot 5 \cdot \cdots \cdot (2n-3)}{3^n n!}\left(\frac{x}{5}\right)^n$

State the radius of convergence R.

$R =$

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4. 3.33/3.33 points | Previous Answers SCalcET7 11.10.036.

Use a Maclaurin series in this table to obtain the Maclaurin series for the given function.

$$f(x) = \frac{x^3}{\sqrt{11 + x}}$$

$\frac{x^3}{\sqrt{11}} +$

- ( ) $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1 \cdot 3 \cdot 5 \cdot \cdots \cdot (2n-1)}{n!\,11^{n+1/2} \cdot 2^n} x^{n+3}$
- (•) $\frac{x^3}{\sqrt{11}} + \sum_{n=1}^{\infty} (-1)^{n} \frac{1 \cdot 3 \cdot 5 \cdot \cdots \cdot (2n-1)}{n!\,11^{n+1/2} \cdot 2^n} x^{n+3}$
- ( ) $\frac{x^3}{\sqrt{11}} + \sum_{n=1}^{\infty} \frac{1 \cdot 3 \cdot 5 \cdot \cdots \cdot (2n-1)}{n!\,11^{n+1/2} \cdot 2^n} x^{n}$
- ( ) $\frac{x^3}{\sqrt{11}} + \sum_{n=1}^{\infty} (-1)^{n+1} \frac{1 \cdot 3 \cdot 5 \cdot \cdots \cdot (2n-1)}{n!\,11^{n+1/2} \cdot 2^n} x^{n}$
- ( ) $\frac{x^3}{\sqrt{11}} + \sum_{n=1}^{\infty} (-1)^{n} \frac{2 \cdot 4 \cdot 6 \cdot \cdots \cdot (2n)}{n!\,11^{n+1/2} \cdot 2^n} x^{n+3}$

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5. 3.33/3.33 points | Previous Answers SCalcET7 11.10.045.

(a) Use the binomial series to expand $\frac{9}{\sqrt{1-x^2}}$.

- ( ) $9 + 9\sum_{n=1}^{\infty} \frac{3 \cdot 5 \cdot 7 \cdot \cdots \cdot (2n+1)}{2^n \cdot n!} x^{2n}$
- ( ) $9 + 9\sum_{n=1}^{\infty} \frac{1 \cdot 3 \cdot 5 \cdot \cdots \cdot (2n-1)}{2^n \cdot n!} x^{n}$
- (•) $9 + 9\sum_{n=1}^{\infty} \frac{1 \cdot 3 \cdot 5 \cdot \cdots \cdot (2n-1)}{2^n \cdot n!} x^{2n}$
- ( ) $9 + 9\sum_{n=1}^{\infty} \frac{3 \cdot 5 \cdot 7 \cdot \cdots \cdot (2n+1)}{2^n \cdot n!} x^{n}$
- ( ) $9 + 9\sum_{n=1}^{\infty} \frac{2 \cdot 4 \cdot 6 \cdot \cdots \cdot (2n)}{2^n \cdot n!} x^{2n}$

(b) Use part (a) to find the Maclaurin series for $9 \sin^{-1} x$.

- ○ $9x + 9\sum_{n=1}^{\infty}\frac{1\cdot 3\cdot 5\cdot\cdots\cdot(2n-1)}{2^n\cdot n!}x^{2n+1}$
- ○ $9x + 9\sum_{n=1}^{\infty}\frac{2\cdot 4\cdot 6\cdot\cdots\cdot(2n)}{(2n+1)\cdot 2^n\cdot n!}x^{2n+1}$
- ◉ $9x + 9\sum_{n=1}^{\infty}\frac{1\cdot 3\cdot 5\cdot\cdots\cdot(2n-1)}{(2n+1)\cdot 2^n\cdot n!}x^{2n+1}$
- ○ $9x + 9\sum_{n=1}^{\infty}\frac{3\cdot 5\cdot 7\cdot\cdots\cdot(2n+1)}{(n+1)\cdot 2^n\cdot n!}x^{n+1}$
- ○ $9x + 9\sum_{n=1}^{\infty}\frac{1\cdot 3\cdot 5\cdot\cdots\cdot(2n-1)}{(n+1)\cdot 2^n\cdot n!}x^{n+1}$

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6. 3.35/3.35 points | Previous Answers SCalcET7 11.10.046.

(a) Expand $\frac{5}{\sqrt[4]{1+x}}$ as a power series.

- ○ $\sum_{n=0}^{\infty}(-1)^{n+1}\frac{1\cdot 5\cdot 9\cdot\cdots\cdot(4n+1)}{4^n\cdot n!}x^n$
- ◉ $5 - \frac{5}{4}x + \sum_{n=2}^{\infty}(-1)^n\frac{1\cdot 5\cdot 9\cdot\cdots\cdot(4n-3)}{4^n\cdot n!}x^n$
- ○ $5 - \frac{5}{4}x + \sum_{n=2}^{\infty}(-1)^n\frac{(2n+1)!}{4^n\cdot n!}x^n$
- ○ $5 - \frac{5}{4}x + \sum_{n=2}^{\infty}\frac{(3n+1)!}{4^n\cdot n!}x^n$
- ○ $5 - \frac{5}{4}x + \sum_{n=2}^{\infty}(-1)^n\frac{1\cdot 4\cdot 7\cdot\cdots\cdot(3n-2)}{4^n\cdot n!}x^n$

(b) Use part (a) to estimate $\frac{5}{\sqrt[4]{1.1}}$ correct to three decimal places.

4.882

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