The Taylor Series of f at a is $f(x) = f(a) + \frac{f'(a)}{1!}(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \frac{f'''(a)}{3!}(x-a)^3 + ...$
The Maclaurin series of f is $f(x) = f(0) + \frac{f'(0)}{1!}x + \frac{f''(0)}{2!}x^2 + \frac{f'''(0)}{3!}x^3 + ...$
Some importantMaclaurin series:

$$\frac{1}{1-x} = 1+x+x^2+x^3+.... = \sum_{n=0}^{\infty} x^n, \quad (-1,1).$$
$$e^x = 1+\frac{x}{1!}+\frac{x^2}{2!}+\frac{x^3}{3!}+.... = \sum_{n=0}^{\infty}\frac{x^n}{n!}, \quad (-\infty,\infty).$$
$$\sin x = x-\frac{x^3}{3!}+\frac{x^5}{5!}-.... = \sum_{n=0}^{\infty}(-1)^n\frac{x^{2n+1}}{(2n+1)!}, \quad (-\infty,\infty).$$
$$\cos x = 1-\frac{x^2}{2!}+\frac{x^4}{4!}-.... = \sum_{n=0}^{\infty}(-1)^n\frac{x^{2n}}{(2n)!}, \quad (-\infty,\infty).$$
$$\tan^{-1} x = x-\frac{x^3}{3}+\frac{x^5}{5}-.... = \sum_{n=0}^{\infty}(-1)^n\frac{x^{2n+1}}{(2n+1)}, \quad [-1,1].$$

The Binomial Series : If k is any real number and $|x|<1$, then $(1+x)^k = 1+kx+\frac{k(k-1)}{2!}x^2+\frac{k(k-1)(k-2)}{3!}x^3+....$

Problem 1. (1 point)

Book Problem 1

If $f(x) = \sum_{n=0}^{\infty} b_n(x-7)^n$ for all x, which of the following formulas for b_2 is true?

Enter T for true and F for false:

__1. $b_2 = \frac{f^{(2)}(0)}{2!}$

__2. $b_2 = \frac{f^{(2)}(7)}{2}$

__3. $b_2 = \frac{f^{(2)}(7)}{2!}$

Answer(s) submitted:
- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 2. (1 point)

Book Problem 3

If $f^{(n)}(0) = (n+4)!$ for $n = 0,1,2,...,$ then the Maclaurin series for f is

$f(x) =$ _____ +... (Enter only the first four nonzero terms.)
Answer(s) submitted:
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 3. (1 point)

Book Problem 4

If $f^{(n)}(7) = \dfrac{(-1)^n n!}{2^n(n+3)}$ for $n = 0, 1, 2, \ldots$, then the Taylor series for f centered at 7 is

$f(x) = \sum_{n=0}^{\infty}$ _____ $(x-7)^n$.

$f(x) =$ ___ + ___ $(x-7)$+___ $(x-7)^2$+ ___ $(x-7)^3 + \ldots$
Answer(s) submitted:

- no response
- no response
- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 4. (1 point)

Book Problem 5

Find the Maclaurin series for $f(x) = \cos(6x)$ using the definition of a Maclaurin series:

$f(x) =$ ____, $f(0) =$ ____,

$f'(x) =$ ____, $f'(0) =$ ____,

$f''(x) =$ ____, $f''(0) =$ ____,

$f^{(3)}(x) =$ ____, $f^{(3)}(0) =$ ____, ...

$\cos(6x) =$ ___ + ___ x+___ x^2+___ $x^3 + \ldots$
Answer(s) submitted:

- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 5. (1 point)

Find the Taylor series for $f(x) = 8+7x+x^2$ centered at $a = 3$:

$f(x) =$ ____, $f(3) =$ ____,

$f'(x) =$ ____, $f'(3) =$ ____,

$f''(x) =$ ____, $f''(3) =$ ____,

$f^{(3)}(x) =$ ____, $f^{(3)}(3) =$ ____, ...

$f(x) =$ ___ + ___ $(x-3)$+___ $(x-3)^2$+___ $(x-3)^3 + ...$
Answer(s) submitted:

- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 6. (1 point)

Find the Taylor series for $f(x) = 6\ln(5x)$ centered at $a = 3$:

$f(x) =$ ____, $f(3) =$ ____,

$f'(x) =$ ____, $f'(3) =$ ____,

$f''(x) =$ ____, $f''(3) =$ ____,

$f^{(3)}(x) =$ ____, $f^{(3)}(3) =$ ____, ...

$6\ln(5x) =$ ___ + ___ $(x-3)$+___ $(x-3)^2$+___ $(x-3)^3 + ...$
Answer(s) submitted:

- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 7. (1 point)

Book Problem 23

Use the binomial series to expand the following functions as a power series. Give the first 3 non-zero terms.

$f(x) = \sqrt[7]{1+x} =$ _____ +...

$g(x) = \sqrt{1+3x} =$ _____ +...

$h(x) = \dfrac{1}{(1-x)^5} =$ _____ +...
Answer(s) submitted:

- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 8. (1 point)

Use the binomial series to expand the following function as a power series. Give the first 3 non-zero terms.

$h(x) = \dfrac{1}{(5+x)^7} =$ ___ + ___ x+ ____ $x^2 + ...$

Answer(s) submitted:

- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 9. (1 point)

Book Problems 27 - 31

Use a Maclaurin series derived in this section to obtain the Maclaurin series for the given functions. Enter the first 3 non-zero terms only.

$f(x) = \cos(4x^4) =$ _____ +...

$f(x) = \sin(-\pi x) =$ _____ +...

$f(x) = x\tan^{-1}(4x) =$ _____ +...

$f(x) = x^4 e^{-x/2} =$ _____ +...

Answer(s) submitted:

- no response
- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 10. (1 point)

Book Problem 41

a) Use the binomial series to give the first 3 non-zero terms of the power series for

$\dfrac{1}{\sqrt{1-9x^2}} =$ _____ +...

b) Evaluate the indefinite integral $\int \dfrac{1}{\sqrt{1-9x^2}} =$ _____ +C.
(your answer should be an antiderivative not a power series)

c) Using parts (a) and (b), give the first 3 non-zero terms of the power series for

$f(x) = \sin^{-1}(3x) =$ _____ +...

Answer(s) submitted:

- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 11. (1 point)

Book Problem 43

Evaluate the indefinite integral as an infinite series. Give the first 3 non-zero terms only.

$\int x\cos(x^6)dx = \int$ (_____ +...)$dx = C +$ _____ +...

Answer(s) submitted:

- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 12. (1 point)

Book Problems 51 - 53

Use series to evaluate the following limits. Give only two non-zero terms in the power series expansions.

$\frac{1+4x-e^{4x}}{x^2} =$ _____ +... , $\lim_{x\to 0}\frac{1+4x-e^{4x}}{x^2} =$ __

$\frac{3x-\tan^{-1}3x}{x^3} =$ _____ +... , $\lim_{x\to 0}\frac{3x-\tan^{-1}3x}{x^3} =$ __

$\frac{\sin x - x + \frac{1}{6}x^3}{4x^5} =$ _____ +... , $\lim_{x\to 0}\frac{\sin x - x + \frac{1}{6}x^3}{4x^5} =$ __

Answer(s) submitted:

- no response
- no response
- no response
- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 13. (1 point)

Book Problem 59

MIX and MATCH

__1. $\sum_{n=0}^{\infty}(-1)^n\frac{4x^{2n+1}}{(2n+1)!}$

__2. $\sum_{n=0}^{\infty}\frac{(-1)^n 4^{2n}x^{2n}}{(2n)!}$

__3. $\sum_{n=0}^{\infty}\frac{(-1)^n 4x^{2n+1}}{2n+1}$

__4. $\sum_{n=0}^{\infty}\frac{4^n x^n}{n!}$

__5. $\sum_{n=0}^{\infty}\frac{(-1)^n x^{4n}}{n!}$

A. $4\arctan(x)$
B. e^{4x}
C. $\cos(4x)$
D. e^{-x^4}
E. $4\sin(x)$

Answer(s) submitted:

- no response
- no response
- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)

Problem 14. (1 point)

Give the first 5 non-zero terms in the power series expansion and evaluate the derivative of the following functions:

$f(x) = e^{4x^2} =$ _____ +... , $f^{(6)}(0) =$ ____.

$g(x) = \tan^{-1}4x =$ _____ +... , $g^{(7)}(0) =$ ____.

Answer(s) submitted:

- no response
- no response
- no response
- no response

submitted: (incorrect)
recorded: (incorrect)