This print-out should have 10 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 10.0 points

Determine if

$$\lim_{x \to 0} \left(\frac{5}{x} - \frac{10}{e^{2x} - 1} \right)$$

exists, and if it does, find its value.

1. limit $= \dfrac{10}{3}$

2. limit $= 5$

3. limit $= 10$

4. limit does not exist

5. limit $= \dfrac{5}{2}$

6. limit $= 0$

002 10.0 points

Find the n^{th} term, a_n, of an infinite series $\sum_{n=1}^{\infty} a_n$ when the n^{th} partial sum, S_n, of the series is given by

$$S_n = \frac{2\,n}{n+1}\,.$$

1. $a_n = \dfrac{2}{n(n+1)}$

2. $a_n = \dfrac{1}{n^2}$

3. $a_n = \dfrac{1}{n(n+1)}$

4. $a_n = \dfrac{1}{n}$

5. $a_n = \dfrac{1}{2n^2}$

6. $a_n = \dfrac{1}{2n}$

003 10.0 points

Determine whether the series

$$\sum_{n=0}^{\infty} 3 \left(\frac{2}{5} \right)^n$$

is convergent or divergent, and if convergent, find its sum.

1. convergent, sum $= 5$

2. convergent, sum $= \dfrac{15}{7}$

3. convergent, sum $= \dfrac{16}{3}$

4. convergent, sum $= -\dfrac{16}{3}$

5. divergent

004 10.0 points

Let h be a continuous, positive, decreasing function on $[2, \infty)$. Compare the values of the series

$$A = \sum_{n=3}^{10} h(n)$$

and the integral

$$B = \int_{2}^{10} h(z)\,dz\,.$$

1. $A > B$

2. $A = B$

3. $A < B$

005 10.0 points

Which one of the following properties does the series

$$\sum_{n=1}^{\infty} (-1)^{n-1} \frac{5n^2 + 1}{3^n}$$

have?

1. divergent

2. conditionally convergent

3. absolutely convergent

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006 10.0 points

Determine whether the series

$$\sum_{n=0}^{\infty} \frac{2}{\sqrt{n+5}} \cos n\pi$$

is conditionally convergent, absolutely convergent or divergent.

1. absolutely convergent

2. divergent

3. conditionally convergent

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007 10.0 points

Determine which, if any, of the following series diverge.

$$(A) \quad \sum_{n=1}^{\infty} \frac{(5n)^n}{n!}$$

$$(B) \quad \sum_{n=1}^{\infty} \frac{5^n}{(n+2)^n}$$

1. both of them

2. B only

3. neither of them

4. A only

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008 10.0 points

Determine the interval of convergence of the power series

$$\sum_{n=1}^{\infty} \frac{1}{n} \frac{x^n}{5^n} .$$

1. interval of cgce $= [-5, 5)$

2. interval of cgce $= (-\infty, \infty)$

3. interval of cgce $= \left(-\frac{1}{5}, \frac{1}{5}\right)$

4. interval of cgce $= [-5, 5]$

5. interval of cgce $= (0, 5)$

6. interval of cgce $= \left(-\frac{1}{5}, 0\right]$

7. converges only at origin

8. interval of cgce $= (-5, 5)$

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009 10.0 points

Find a power series representation for the function

$$f(x) = \tan^{-1}(3x) .$$

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

2. $f(x) = \displaystyle\sum_{n=0}^{\infty} \frac{1}{2n+1} x^{2n}$

3. $f(x) = \displaystyle\sum_{n=0}^{\infty} (-1)^n \frac{3^{2n+1}}{2n+1} x^{2n+1}$

4. $f(x) = \displaystyle\sum_{n=0}^{\infty} \frac{3^{2n+1}}{2n+1} x^{2n+1}$

5. $f(x) = \displaystyle\sum_{n=0}^{\infty} (-1)^n \frac{3^{2n}}{2n+1} x^{2n}$

6. $f(x) = \displaystyle\sum_{n=0}^{\infty} \frac{1}{2n+1} x^{2n+1}$

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010 10.0 points

Find the degree 2 Taylor polynomial of f centered at $x = 2$ when

$$f(x) \;=\; 5x \ln x \,.$$

1. $10 + 2 \ln 5(x-2) + \dfrac{5}{4}(x-2)^2$

2. $10 + 5 \ln 2(x-2) + \dfrac{5}{2}(x-2)^2$

3. $10 \ln 2 + 5(\ln 2 + 1)(x-2) + \dfrac{5}{2}(x-2)^2$

4. $10 \ln 2 + 5(\ln 2 + 1)(x-2) + \dfrac{5}{4}(x-2)^2$

5. $10 + 5(\ln 2 + 1)(x-2) + \dfrac{5}{4}(x-2)^2$

6. $10 \ln 2 + 5 \ln 2(x-2) + \dfrac{5}{4}(x-2)^2$