This print-out should have 18 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. V1:1, V2:1, V3:3, V4:1, V5:1.

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001 (part 1 of 1) 10 points

Determine whether the series

$$\sum_{n=2}^{\infty} (-1)^n \frac{n}{4 \ln n}$$

is conditionally convergent, absolutely convergent, or divergent.

1. series is conditionally convergent

2. series is divergent

3. series is absolutely convergent

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002 (part 1 of 1) 10 points

Which one of the following properties does the series

$$\sum_{n=3}^{\infty} (-1)^n \frac{4^n}{(\ln n)^n}$$

have?

1. divergent

2. conditionally convergent

3. absolutely convergent

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003 (part 1 of 1) 10 points

Which one of the following properties does the series

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

have?

1. conditionally convergent

2. divergent

3. absolutely convergent

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004 (part 1 of 1) 10 points

Which one of the following properties does the series

$$\sum_{m=3}^{\infty} (-1)^{m-1} \frac{m-2}{m^2+m-4}$$

have?

1. conditionally convergent

2. absolutely convergent

3. divergent

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005 (part 1 of 1) 10 points

Determine whether the series

$$3 - 4 + \frac{16}{3} - \frac{64}{9} + \frac{256}{27} + \cdots$$

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

1. convergent with sum $= 3$

2. convergent with sum $= 4$

3. convergent with sum $= \dfrac{9}{7}$

4. series is divergent

5. convergent with sum $= \dfrac{8}{7}$

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006 (part 1 of 1) 10 points

Determine the convergence or divergence of the series

$$(A) \qquad \sum_{m=1}^{\infty} \frac{5\ln(3m)}{m^2},$$

and

$$(B) \qquad \sum_{m=1}^{\infty} \frac{\sin^2 m}{m^2+4}.$$

1. both series converge

2. both series diverge

3. A converges, B diverges

4. A diverges, B converges

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007 (part 1 of 1) 10 points

Determine the convergence or divergence of the series

$$(A) \qquad 1 + \frac{1}{8} + \frac{1}{27} + \frac{1}{64} + \frac{1}{125} + \dots,$$

and

$$(B) \qquad \sum_{m=1}^{\infty} m^3 e^{-m^4}.$$

1. both series convergent

2. both series divergent

3. A divergent, B convergent

4. A convergent, B divergent

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008 (part 1 of 1) 10 points

Which, if any, of the following series converge?

$$(A) \qquad \sum_{k=1}^{\infty} \frac{1}{k\ln k + 3}$$

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

1. A and B

2. A but not B

3. B but not A

4. neither A nor B

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009 (part 1 of 1) 10 points

Decide which, if any, of the following series converge.

$$(A) \quad \sum_{n=1}^{\infty} \frac{n^8}{n+3}\left(\frac{3}{8}\right)^n$$

$$(B) \quad \sum_{n=1}^{\infty} \left(\frac{4n+7}{n^3+8}\right)^n$$

1. B only

2. neither of them

3. both of them

4. A only

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010 (part 1 of 1) 10 points

If the improper integral

$$\int_1^{\infty} \frac{1}{x^p}\,dx$$

converges, which of the following statements is (are) always true?

(A) $\quad \sum_n \frac{1}{n^p}$ converges;

(B) $\quad \sum_n \frac{1}{n^{p+1}}$ diverges;

(C) $\quad \sum_n \frac{1}{n^{p-1}}$ converges;

(*D*) $\sum_n \frac{1}{n^{p-1}}$ diverges;

(*E*) $\sum_n \frac{1}{n^{p+1}}$ converges.

1. A and E only

2. B and D only

3. A, D and E

4. A, C and E only

5. A only

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011 (part 1 of 1) 10 points

Find the interval of convergence of the power series

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

1. interval $= (-4, 4)$

2. interval $= \left[-\frac{1}{4}, \infty\right)$

3. interval $= (-\infty, \infty)$

4. interval $= \left(-\infty, \frac{1}{4}\right)$

5. interval $= \left[-\frac{1}{4}, \frac{1}{4}\right]$

6. interval $= \left(-\frac{1}{4}, \frac{1}{4}\right)$

7. interval $= [-4, 4]$

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012 (part 1 of 1) 10 points

Determine the interval of convergence of the series

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

1. converges only at $x = -2$

2. interval convergence $= [-6, 2)$

3. interval convergence $= [-2, 6]$

4. interval convergence $= (-6, 2]$

5. interval convergence $= (-\infty, \infty)$

6. interval convergence $= [-2, 6)$

7. interval convergence $= (-6, 2)$

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013 (part 1 of 1) 10 points

Suppose

$$T_4(x) = 6 - 3(x-1) + 7(x-1)^2 - 8(x-1)^3 + 4(x-1)^4$$

is the degree 4 Taylor polynomial centered at $x = 1$ for some function f.

What is the value of $f^{(3)}(1)$?

1. $f^{(3)}(1) = -\frac{8}{3}$

2. $f^{(3)}(1) = -48$

3. $f^{(3)}(1) = \frac{8}{3}$

4. $f^{(3)}(1) = -8$

5. $f^{(3)}(1) = 48$

6. $f^{(3)}(1) = 8$

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014 (part 1 of 1) 10 points

Find the degree 3 Taylor polynomial $T_3(x)$ for f centered at the origin when

$$f(x) = xe^{-3x} .$$

1. $T_3(x) = x - 3x^2 + \frac{9}{2}x^3$

2. $T_3(x) = 1 + x - 3x^2 - \dfrac{9}{2}x^3$

3. $T_3(x) = 1 + x + 3x^2 - \dfrac{9}{2}x^3$

4. $T_3(x) = 1 + x - 3x^2 + \dfrac{9}{2}x^3$

5. $T_3(x) = x + 3x^2 - \dfrac{9}{2}x^3$

6. $T_3(x) = x - 3x^2 - \dfrac{9}{2}x^3$

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015 (part 1 of 1) 10 points

Use the degree 2 Taylor polynomial centered at the origin for f to estimate the definite integral

$$I = \int_0^1 f(x)\,dx$$

when

$$f(x) = \sqrt{1+x^2}.$$

1. $I \approx \dfrac{3}{2}$

2. $I \approx 1$

3. $I \approx \dfrac{7}{6}$

4. $I \approx \dfrac{5}{3}$

5. $I \approx \dfrac{4}{3}$

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016 (part 1 of 1) 10 points

Find a power series representation for the function

$$f(z) = \frac{1}{z-3}.$$

1. $f(z) = \displaystyle\sum_{n=0}^{\infty} (-1)^{n-1}3^{n+1}\, z^n$

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

3. $f(z) = \displaystyle\sum_{n=0}^{\infty} (-1)^n 3^n\, z^n$

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

5. $f(z) = -\displaystyle\sum_{n=0}^{\infty} 3^n\, z^n$

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017 (part 1 of 1) 10 points

Find a power series representation centered at the origin for the function

$$f(x) = \frac{1}{(5-x)^2}.$$

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

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

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

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

5. $f(x) = \displaystyle\sum_{n=1}^{\infty} \frac{n}{5^n}\, x^{n-1}$

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

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018 (part 1 of 1) 10 points

Find the Taylor series centered at the origin for the function

$$f(x) = x\cos(3x).$$

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

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

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

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

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