



Philadelphia University
Department of Basic Sciences and Mathematics



Academic Year:	2017–2018	Course Name:	Computer Aided Math.
Semester:	Second Semester	Course Number:	250372
Exam:	Final Exam	Instructor Name:	Feras Awad
Exam Date:	24/05/2018	Student Name:	_____
Exam Day:	Thursday	University ID:	_____
Mark:	[40]	Section:	[1]

Use *Mathematica* to answer the following questions.

- 3 1. Find the Taylor polynomial of degree 3 about $x_0 = 1$ for $f(x) = x \ln x$.

- 3 2. Find the interval of convergence for the real power series $\sum_{n=1}^{\infty} \frac{(x-4)^n}{n\sqrt{n}}$.

- 3 3. What is the general term formula for the sequence

$$\frac{2}{3}, \frac{5}{3}, \frac{27}{10}, \frac{56}{15}, \frac{81}{14}, \frac{245}{36}, \dots$$

- 3 4. Evaluate $\prod_{n=1}^{\infty} \left(1 + \frac{1}{2^{2^n}}\right)$.

- 3 5. Find the value of $\frac{d}{dx}(x^x) \Big|_{x=1}$.

- 3 6. To what value will the **infinite sum**

$$\frac{3}{2} + \frac{3+5}{2 \times 4} + \frac{3+5+7}{2 \times 4 \times 6} + \frac{3+5+7+9}{2 \times 4 \times 6 \times 8} + \dots$$

converge?

- 3 7. Find the domain of the function

$$f(x) = \frac{x - \ln(9 - x^2)}{\sqrt{1 - e^{2x}}}.$$

- 3 8. Evaluate $\lim_{x \rightarrow 2^+} \frac{x^2 - 4}{|x^2 - 5x + 6|}$.

- 3 9. Find the interval of decreasing of $f(x) = \sqrt{x+5} \tan^{-1}(x^3 - 27)$.

- 3 10. Find the integer solutions of the equation

$$\left(\sqrt{7 + \sqrt{48}}\right)^x + \left(\sqrt{7 - \sqrt{48}}\right)^x = 14$$

- 3 11. Evaluate $\int_0^4 \frac{1+x^2}{\sqrt{x}} dx$.

- 3 12. If the least common multiple of the integers 861 and x is 9471, find x .

- 4 13. An integer **M** is called **Moran number** if it is divisible by the sum of its digits with prime quotient. For example, 21 is Moran number since $21 \div (2+1) = 7$ and 7 is prime. How many Moran numbers are there less than or equal to 2018?