MATH F252X - Midterm # 1

Park - Fall 2018

Date:

Print Your First & Last Name CLEARLY

Proctor Name

Start Time:

End Time:

- **Student Responsibilities**

    - It is the student's responsibility to keep track of their time. Students will be penalized for using more than the allotted time at a rate of 2 points per five minutes. **The total allotted time on this exam is 65 minutes.**

    - It is the student's respsonsibility to ensure all pages are included in order with the exam. The exam is 8 pages, including the cover sheet.

- **Specific Intructions**

    - You will have **65 minutes** to complete this exam.

    - This exam is closed book, closed notes, and you may not use a calculator.

    - In order to receive full credit you must show your work. Include your computations on the exam paper.

    - Place a box around your final answer to each question when appropriate.

    - Fully distribute all coefficients in each of your answers.

Total Possible Points	Score	Percent
100 (5 Extra Credit)		

(16 points, 8 points each) Evaluate the following integrals.

1. $\int_0^{\pi/2} \sin^5 x dx$

2. $\int \sin^{-1}(3x) dx$

(16 points, 8 points each) Evaluate the following integrals.

3. $\int \cos^4(2\theta)d\theta$

4. $\int \dfrac{dx}{(x^2 + 4)^{3/2}}$

(16 points, 8 points each) Evaluate the following integrals.

5. $\int e^x \cos(2x)dx$

6. $\int \dfrac{x^3 - 4x - 10}{x^2 - x - 6}dx$

(16 points, 8 points each) Evaluate the following integrals.

7. $\int \dfrac{10}{(x-1)(x^2+9)}dx$

8. $\int_0^5 t\sqrt{25 - t^2}\,dt$

9. (4 points) Give the partial decomposition for the function $f(x) = \dfrac{2x+1}{(x+1)^3(x^2+4)^2}$ Do not determine the numerical value of the coefficeints.

(16 points, 8 points each) Determine whether each integral is convergent or divergent. Evaluate those that are convergent. Clearly explain why the integral diverges, if applicable.

10. $\displaystyle\int_e^\infty \frac{1}{x(\ln x)^3}\,dx$

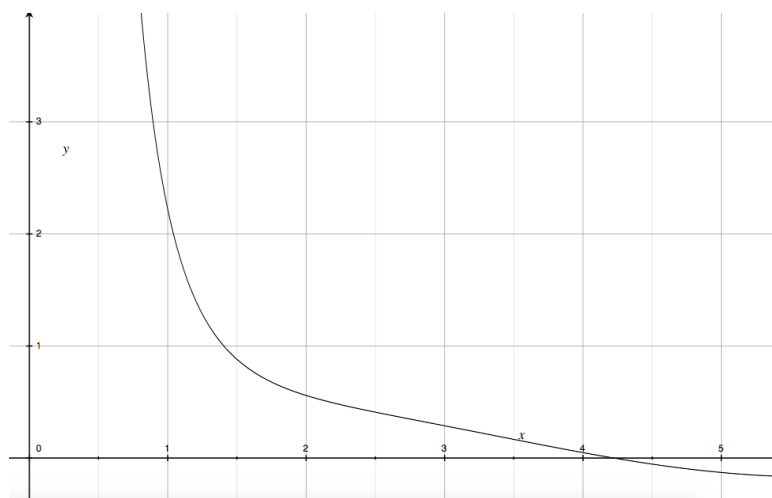11. $\displaystyle\int_0^5 \frac{2}{(5-x)^4}\,dx$

12. (16 points) Set up an expression that approximates the integral $\int_1^5 \frac{\cos x}{x}$ with $n = 4$ using the technique specified below.

(a) (4 points) Midpoint Rule.

(b) (4 points) Trapezoid Rule.

(c) (4 points) Simpson's Rule.

(d) (4 points) Approximate the error, E_M, involved in the approximation from part (a) above using the graph of $f''(x)$ and error formula that are given below. Sketch the graph of $|f''(x)|$ on the same grid where $f''(x)$ is given and briefly explain how you chose the value of K.

Error Formula
$|E_M| \leq \frac{K(b-a)^3}{24n^2}$ where $|f''(x)| \leq K$ for $a \leq x \leq b$

13. (Extra Credit 5 points) Evaluate $\displaystyle\int \sin(\sqrt[3]{x})\,dx$