Math 242 Exam 2, Spring 2024

Name:

Section: 7 8

Question	Points	Score
1	0	
2	0	
3	0	
4	0	
5	0	
6	0	
Total:	0	

- You have 75 minutes to complete this exam.
- Please ask if anything seems confusing or ambiguous.
- You must show all your work unless the problem states otherwise. You will get almost no credit for solutions that are not fully justified.
- You may not use notes or calculators on this exam.
- You do not need to simplify your answers.
- Good luck!

Homework	
Worksheets	
Quizzes	
Exam 1	
Exam 2	
Total	

1. Evaluate the following integrals.

(a) $\displaystyle\int \frac{1}{\sqrt{4-x}}\,dx.$

(b) $\displaystyle\int \frac{1}{\sqrt{4-x^2}}\,dx.$

(c) $\displaystyle\int \sqrt{4-x^2}\,dx.$

(d) $\displaystyle\int \frac{x}{\sqrt{4-x^2}}\,dx.$

(e) $\displaystyle\int \frac{1}{\sqrt{4-x^4}}\,dx.$

(f) $\displaystyle\int \frac{1}{x\sqrt{4-x^2}}\,dx.$

(g) $\displaystyle\int \frac{\sqrt{4-x^2}}{x}\,dx.$

(h) $\displaystyle\int \frac{x^2}{\sqrt{4-x^2}}\,dx.$

(i) $\displaystyle\int \frac{1}{x\sqrt{x^2-4}}\,dx.$

(j) $\displaystyle\int \frac{1}{x^2\sqrt{x^2-4}}\,dx.$

(k) $\displaystyle\int \frac{1}{\sqrt{x^2-4}}\,dx.$

(l) $\displaystyle\int \frac{1}{\sqrt{x^2+4}}\,dx.$

(m) $\displaystyle\int \frac{x^3}{\sqrt{x^2+4}}\,dx.$

(n) $\displaystyle\int \frac{1}{x^2+4}\,dx.$

(o) $\displaystyle\int \frac{x}{x^2+4}\,dx.$

(p) $\displaystyle\int \frac{x^2}{x^2+4}\,dx.$

(q) $\displaystyle\int \frac{x}{x^2+8x+7}\,dx.$

(r) $\displaystyle\int \frac{x+1}{x^2-4}\,dx.$

(s) $\displaystyle\int \frac{x}{x^2-2x+4}\,dx.$

(t) $\displaystyle\int \frac{3}{x^3+2x}\ dx.$

(u) $\displaystyle\int \cos^5(x)\ dx.$

(v) $\displaystyle\int \sec^4 x\ dx.$

(w) $\displaystyle\int \sin^2 x \cos^3 x\ dx.$

(x) $\displaystyle\int \cos^2 x\ dx.$

(y) $\displaystyle\int \sin^4 x\ dx.$

(z) $\displaystyle\int \cot^2 x\ dx.$

2. (a) $\displaystyle\int \cot^3 x \csc^3 x\ dx.$

(b) $\displaystyle\int \tan^3 x \sec^3 x\ dx.$

(c) $\displaystyle\int \tan^4 x \sec^4 x\ dx.$

(d) $\displaystyle\int \sin(2x)\cos(3x)\ dx.$

(e) $\displaystyle\int \sin(2x)\sin(3x)\ dx.$

(f) $\displaystyle\int_{-1}^{1} \frac{1}{x}\ dx.$

(g) $\displaystyle\int_0^{\infty} \frac{2x}{(1+x^2)^3}\ dx.$

(h) $\displaystyle\int_0^{1} \frac{1}{\sqrt{1-x^2}}\ dx.$

(i) $\displaystyle\int_0^{2} \frac{1}{(x-1)^{2/5}}\ dx.$

(j) $\displaystyle\int_1^{\infty} \frac{\ln x}{x^3}\ dx.$

(k) $\displaystyle\int_0^{\infty} \frac{1}{x^2+4}\ dx.$

(l) $\displaystyle\int_3^{\infty} \frac{1}{x^2-4}\ dx.$

(m) $\displaystyle\int_1^{2} \frac{1}{x\ln x}\ dx.$

3. Give the abstract partial fration decomposition for

$$\frac{x^3 + x - 17}{x^3(x^2+7)^3(2x-1)}$$

4. Approximate $\int_{-2}^{2} x^3 \, dx$ using S_4 and T_4.

5. For the following integrals find an n that guarantees that Simpson's Rule S_n is within and error of at most 10^{-4}. Some useful absolute value properties are $|ab| = |a||b|$ and $|a+b| \leq |a| + |b|$. You do not have to simplify your answer.

   (a) $\displaystyle\int_0^1 x\cos(2x) \, dx$. You are given that $\dfrac{d^4}{dx^4} x\cos(2x) = 16(2\sin(2x) + x\cos(2x))$.

   (b) $\displaystyle\int_{-1}^1 e^{-x^2} \, dx$. You are given that $\dfrac{d^4}{dx^4} e^{-x^2} = 4e^{-x^2}(4x^2 - 12x^2 + 3)$.

   (c) $\displaystyle\int_{-1}^0 \frac{1}{1-x} \, dx$. You are given that $\dfrac{d^4}{dx^4} \dfrac{1}{1-x} = \dfrac{24}{(1-x)^5}$.

6. Find the limit of the following sequences.

   (a) $a_n = 3 + (0.1)^n$

   (b) $a_n = \dfrac{2n+1}{1-\sqrt{n}}$

   (c) $a_n = (-1)^n \left(1 - \dfrac{1}{n}\right)$

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

   (e) $a_n = \left(1 + \dfrac{9}{n}\right)^n$

   (f) $a_n = \ln n - \ln(n+1)$

   (g) $a_n = \sqrt[n]{n^4}$

   (h) $a_n = \dfrac{n!}{5^n 6^n}$

   (i) $a_n = \displaystyle\sum_{k=1}^{n} (-1)^n \frac{1}{2^n}$

   (j) $a_n = 5^{1/n}$

   (k) $a_n = (1.2)^n$

   (l) $a_n = \dfrac{2^n}{2^n - 1}$

   (m) $a_n = \dfrac{n!}{(n+2)!}$

   (n) $a_n = \dfrac{4^n}{n!}$