Math 129 Calculus II  Exam # 1, Sections 7.1 - 7.5  Time allowed: 60 minutes

---

1. Which of the following techniques could be used to evaluate the following integral

$$\int \frac{x}{\sqrt{25-x^2}}\,dx.$$

Circle all that apply. [*12 points* ]

(a) Substitution: Let $w = 25 - x^2$.

(b) Integration by parts: Let $u = \dfrac{1}{\sqrt{25-x^2}}$, $v' = x$

(c) Integration by parts: Let $u = x$, $v' = \dfrac{1}{\sqrt{25-x^2}}$

(d) Partial Fractions: Decompsition structure given by $\dfrac{A}{5-x} + \dfrac{B}{5+x}$

(e) Trigonometric Substitution: Let $x = 5\sin(\theta)$

(f) Trigonometric Substitution: Let $x = 5\tan(\theta)$

2. Circle the answer corresponding to the partial fraction expansion of

$$\frac{x^4-1}{x(x^2+4)}$$

Note: There is only one correct answer. [*3 points* ]

(a) $\dfrac{A}{x} + \dfrac{Bx+C}{x^2+4}$

(b) $\dfrac{A}{x} + \dfrac{B}{x-4} + \dfrac{C}{x+4}$

(c) $x + \dfrac{A}{x} + \dfrac{Bx+C}{x^2+4}$

(d) $x + \dfrac{A}{x} + \dfrac{B}{x-4} + \dfrac{C}{x+4}$

3. Evaluate the definite integral

$$\int_0^{\pi^2} \frac{\sin\left(\frac{1}{4}\sqrt{x}\right)}{3\sqrt{x}}\,dx$$

[*15 points* ]

4. If $f$ is a twice differentiable function, find an expression for

$$\int f''(x)\ln(x)\,dx + \int \frac{f(x)}{x^2}dx.$$

(Your answer should contain $f$ and $f'$ but no integrals.) [*15 points* ]

5. (a) Peyton Manning wants to calculate the integral below without using the table.

$$\int (5x^2 - 8)\,e^{x/2}\,dx$$

Do **not** evaluate the integral, but intead, recommend a strategy for Mr. Manning and write **one** sentence explaining what he should expect to see. [*3 points* ]

(b) Use the table to evaluate the integral from (a). [*12 points* ]

6. Calculate the following definite integral without using the tables.

$$\int_1^2 \frac{x^3 + 25}{x^2(x-5)}\,dx.$$

[*15 points* ]

7. Use an appropriate trigonometric substitution to calculate the integral

$$\int x^4\sqrt{1-4x^2}\,dx.$$

[*15 points*]

8. (a) Use the trapezoid rule with three subdivisions to estimate the value of the integral

$$\int_0^1 \sin\left(e^x\right)\,dx.$$

[*5 points*]

(b) Is your answer and overestimate or an underestimate? Explain. [*2 points*]

(c) Cam Newton sees your work in part (a) and suggests using three subdivisions to evaluate the integral

$$\int_2^3 \sin\left(e^x\right)\,dx.$$

Write **one** sentence to explain to Mr. Newton why this is not a good idea. (Hint: Draw a sketch.)[*3 points*]