Math 142—Exam I

Instructor: Shaoyun Yi Name: _____

⋆ **No calculators** are allowed during this exam.

⋆ You are required to show your work on each problem on this exam. The following rules apply:

• **Organize your work**, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit.

• **Mysterious or unsupported answers will not receive full credit.** A correct answer, unsupported by calculations or explanation will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.

• **Indicate your final answer with a** $\boxed{\text{box}}$ **.**

1. [**15 points**] Compute $\displaystyle\int \sin^4(x)\cos^5(x)\,dx$

2. **[20 points]** Find $\int e^x \cos(3x)\, dx$

3. **[20 points]** Find $\displaystyle\int \frac{x^2}{\sqrt{16-x^2}}\,dx$

4. **[25 points]** Solve $\displaystyle\int \frac{3x^3+7x^2+3x+5}{(x^2+1)(x+1)^2}\,dx$

5. [**10 points**] Determine if the following improper interval converge or diverge. If the integral converges, determine what it converges to. Your answer should use proper notation.

$$\int_2^\infty xe^{-x^2}\,dx$$

6. [**10 points**] Which of the sequences $\{a_n\}_{n=1}^{\infty}$ converge, and which diverge? Find the limit of each convergent sequence.

(a) $a_n = \dfrac{4n^3 - 1}{n^3 + 8n}$

(b) $a_n = \dfrac{\sin n}{n^2}$

Honor Statement: I understand that it is the responsibility of every member of the Carolina community to uphold and maintain the University of South Carolina's Honor Code.
As a Carolinian, I certify that I have neither given nor received unauthorized aid on this exam.

Printed Name: _____ Signature: _____

Problem	**1**	**2**	**3**	**4**	**5**	**6**	Total
Points	15	20	20	25	10	10	100
Score							