MAC2312 Spring 2019

Exam 2 Mar 18, 2019

- This exam is closed-book and closed-note.
- **Any electronic device with screen (calculator, mobile phone, smartwatch, etc.) is not allowed. Put them away.**
- Make sure that your answers ar**e legible and neatly organized**.
- Your answers self-explanatory. Make sure your answers include **appropriate amount work** and **clearly show final answers**. Illegible, non-self-explanatory, or untidy answers will NOT earn full credit.
- **Use correct notations.**
- Use backsides only for scratch work. **Backsides shall not be graded** unless there are clear pointers on the front sides.
- Scratch paper will be provided upon request.
- Make sure your booklet has all problems indicated in the scorebox.
- The exam ends in 90 minutes after start.
- **DETACH this page** from the booklet when you begin. **The detached page is yours. Do not hand in.**
- Some useful formulas:

$$\cos^2 x + \sin^2 x = 1.\ 1 + \tan^2 x = \sec^2 x\,.\cos 2x = \cos^2 x - \sin^2 x\,.$$

$$\cos\alpha\cos\beta = \frac{\cos(\alpha+\beta)+\cos(\alpha-\beta)}{2}.$$

$$\int \sec x\,dx = \ln|\sec x + \tan x| + C.$$

First Initial **Last name (up to 9 letters) all in CAPITAL** **Section Number**

1(a) Calculate the indefinite integral

$$\int \ln x \ dx.$$

Final answer

(b) Calculate the indefinite integral

$$\int x \cos 3x \, dx.$$

Final answer

2. (a) Calculate the indefinite integral

$$\int \cos 3x \cos x \, dx$$

Final answer

(b) Calculate the indefinite integral

$$\int \cos^2 x \sin^3 x \, dx.$$

Final answer

#1	#2	#3	#4	#5	Total

3. Calculate the indefinite integral

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

Final
answer

4. (a)(5pt) Setup the partial fraction decomposition for

$$\frac{2x+1}{(x-3)^2(x^2+16)}.$$

Setup only. Do NOT do anything further.

(b)(15pt) Calculate the indefinite integral

$$\int \frac{3x}{(x-2)(x+1)(x+2)}\,dx.$$

Final answer

5. (a) Following the definition of improper integral, calculate

$$\int_1^5 \frac{1}{(x-2)^{\frac{1}{3}}}\,dx$$

Final answer

(b) Using an appropriate test, determine the convergence of

$$\int_2^\infty \frac{1}{x^3-2}\,dx.$$

(You don't need to calculate the improper integral.)

Final answer