Calculus II
Midterm 1   Fall 2018

Name: _____   **ID:** _____

Instructions:

(1) Fill in your name and Columbia University ID at the top of this cover sheet.

(2) This exam is closed-book and closed-notes; no calculators, no phones.

(3) Leave your answers in exact form (e.g. $\sqrt{2}$, not ≈ 1.4) and simplify them as much as possible (e.g. $1/2$, not $2/4$) to receive full credit.

(4) Answer all questions in the space provided. If you need more room use the blank backs of the pages.

(5) Show your work; correct answers alone will receive only partial credit.

(6) This exam has 5 extra credit points.

Problem	1 (10 pts)	2 (10 pts)	3 (15 pts)	4 (15 pts)	5 (15 pts)	6 (15 pts)	7 (25 pts)	Total (105 pts)
Score								

Evaluate the following integrals:

1. $\displaystyle \int \frac{3x - 1}{x^2 + x - 6}\, dx$

2. $\displaystyle \int e^x \sin(8x)\, dt$

3. $\displaystyle\int_1^e \ln(x^3)\,dx$

4. $\displaystyle\int x^3 \cos(x^2)\,dx$

5. $\displaystyle\int_0^{\frac{\pi}{6}} \sin^2(2x)\cos(x)\,dx$

6. Sketch the region enclosed by the given curves and find its area:

$$x = y^4, \qquad y = \sqrt{x - 2}, \qquad y = 0$$

7. Let $\mathcal{R}$ be the region enclosed by the curve $x = y^2 - 4y + 8$ and the line $y = x - 2$.

(a) Find the intersection points of the curve $x = y^2 - 4y + 8$ and the line $y = x - 2$. Sketch the shape of $\mathcal{R}$.

(b) Let $\mathcal{S}$ be the solid given by rotating the region $\mathcal{R}$ about the x-axis. Find the volume of $\mathcal{S}$.

(c) Let $\mathcal{T}$ be the solid given by rotating the region $\mathcal{R}$ about the horizontal line $x = 3$. Find the volume of $\mathcal{T}$.