

**Name:** \_\_\_\_\_

**4-digit code:** \_\_\_\_\_

- Write your name and the last 4 digits of your SSN in the space provided above.
- The test has four (4) pages, including this one.
- Show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit.
- Credit for each problem is given at the right of each problem number.
- No books, or notes may be used on this test.
- Calculators are allowed (and encouraged) provided they do not have a Computer Algebra System (CAS).

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Page	Max	Points
2	30	
3	35	
4	35	
<b>Total</b>	100	

**Problem 1** (30 pts). Evaluate the integrals below

(a)  $\int_0^\pi \cos \theta \sin \theta \, d\theta$

(b)  $\int_0^\infty \frac{\sin(\frac{\pi}{2}e^{-x})}{e^x} \, dx$

(c)  $\int_0^{\pi^2/4} \frac{\cos \sqrt{t}}{\sqrt{t}} \, dt$

**Problem 2** (10 pts). Compute the area of the region bounded by the graphs of  $y = \cos x$  and  $y = \sin x$  between  $x = 0$  and  $x = 2\pi$ .

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**Problem 3** (20 pts). Find the area of the region bounded by the graphs of  $y = \frac{1}{x}$ ,  $y = \frac{1}{x^2}$  and  $x = 2$ .



**Problem 4.** We want to compute the volume of the solid obtained by rotating the region bounded by the curve  $y = \sqrt{x}$  between  $x = 1$  and  $x = 9$  about the  $x$ -axis. Express this volume as an integral, by using either a washers or a shell method.

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**Problem 5** (20 pts). We want to compute the volume of the solid obtained by rotating the curve  $x = 4y^2 - y^3$  about the  $y$ -axis. Express this volume as an integral, by using either a washers or a shell method.

**Hint:** You need to find first the interval of integration, by computing where the given curve intersects the  $y$ -axis.