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, notes or calculators may be used on this test.

Page	Max	Points
2	30	
3	35	
4	35	
Total	100	

Problem 1 (10 pts). Use the fundamental Theorem of Calculus to find the derivative of the function

$$h(x) = \int_2^{1/x} \arctan t \, dt$$

Problem 2 (20 pts). Evaluate the indefinite integrals below

[5 pts] $\int \cos\theta \sin\theta \, d\theta$

[5 pts] $\int e^x \sin(e^x) \, dx$

[10 pts] $\int \frac{\cos\sqrt{t}}{\sqrt{t}} \, dt$

Problem 3 (15 pts). Find the area of the region bounded by the graphs of $y = \dfrac{1}{x}$, $y = \dfrac{1}{x^2}$ and $x = 2$.

Problem 4 (20 pts). Find the volume of the solid obtained by rotating the region bounded by the curves $y = \ln x$, $y = 1$, $y = 2$ and $x = 0$ about the y–axis.

Problem 5 (15 pts). Find the volume of the solid obtained by rotating the region bounded by the curves $x = 4y^2 - y^3$ and $x = 0$ about the y–axis.

Problem 6 (20 pts). Find all numbers b such that the average value of $f(x) = 2 + 6x - 3x^2$ on the interval $[0, b]$ is 3.