*Last name:*_____ *First name:*_____

PLEASE READ THIS BEFORE YOU DO ANYTHING ELSE!

1. Make sure that your exam contains 7 pages, including this one.
2. **NO** calculators, books, notes or other written material allowed.
3. Express all numbers in exact arithmetic, i.e., no decimal approximations.
4. Read the statement below and sign your name.

   I affirm that I neither will give nor receive unauthorized assistance on this examination. All the work that appears on the following pages is entirely my own.

   Signature: _____

1. Find the indefinite integrals.

   (a)

   $$\int \csc\left(t^2+1\right)\cot\left(t^2+1\right)4t\ dt$$

   (b)

   $$\int \frac{\sec u \tan u}{2\sec u - 1}\ du$$

   (c)

   $$\int e^{\cot x}\csc^2 x\ dx$$

(d)

$$\int \ln x^3 \, dx$$

(e)

$$\int x(x-1)^{4/3} \, dx$$

(f)

$$\int \frac{x}{e^x} \, dx$$

2. Find the definite integrals.

   (a)

$$\int_{-3}^{3} |2x+4| + 3x - 4 \, dx$$

   (b)

$$\int_{-\pi}^{\pi} (x^4 + 1) \sin x \, dx$$

(c)

$$\int_{-\pi}^{\pi} x^2 \cos x \; dx$$

3. Find the area of the region bounded by the graphs: $y = -x^2 \ln x, y = 0, x = 1$, and $x = e$.

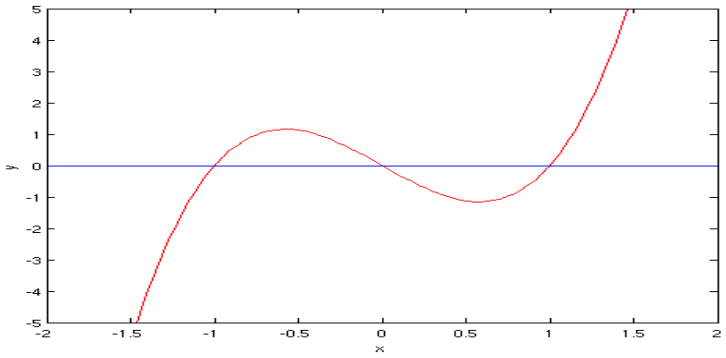
4. Find the volume of the solid formed by revolving the graph of

$$y = \sqrt{\frac{x}{2}} + 1, \quad 0 \leq x \leq 4$$

about the line $y = 1$.

5. Find the volume of the solid formed by revolving the graph of $y = \sqrt{x}$ for $1 \leq x \leq 4$ about the y-axis.

6. Find the area of the region bounded by the graphs of $f(x) = 3(x^3 - x)$ and $g(x) = 0$. Hint: The graph of $f(x)$ and $g(x)$ is shown.



7. Find the average value of the function $f(x) = x\sqrt{4 - x^2}$ over the interval $[0, 2]$. Find all x-values in the interval for which the function is equal to its average value.