Practice Exam 2

1. (10 points) Evaluate
$$\int \ln x \, dx$$

2. (15 points) Evaluate
$$\int xe^{-x} \, dx \qquad \text{and} \qquad \int e^{-\sqrt{x}} \, dx$$

3. (10 points) Evaluate
$$\int \tan^5 x \, dx$$

4. (10 points) Evaluate
$$\int \sec^4 x \, dx$$

5. (10 points) Evaluate
$$\int \frac{x^2}{\sqrt{4 - x^2}} \, dx$$

6. (15 points) Evaluate
$$\int \frac{\sqrt{x - 1}}{x + 3} \, dx$$

7. (15 points) Evaluate
$$\int \frac{x^3 - 1}{x^2(x^2 + 1)} \, dx$$

8. (15 points) Determine if the following improper integrals are convergent or divergent. Evaluate those which converge.

   (a)
   $$\int_2^5 \frac{1}{\sqrt{x - 2}} \, dx$$

   (b)
   $$\int_e^\infty \frac{1}{x(\ln x)^2} \, dx$$

   (c)
   $$\int_0^{\pi/3} \frac{\sec x}{x^2} \, dx$$