Math 123 Practice Midterm 1

Problem	Score (out of)
1	(10)
2	(10)
3	(10)
4	(10)
5	(10)
6	(10)
7	(10)
Total	(70)

1. (10 pts) Evaluate the following integral

$$\int \frac{\ln(x)}{\sqrt{x}}dx$$

2. (10 pts) Evaluate the following integral

$$\int \frac{x^4}{(x+1)^2(x^2+1)} dx$$

3. (10 pts) Evaluate the following integral

$$\int \frac{1}{(1-x^2)^{\frac{3}{2}}}\,dx$$

4. (10 pts) Evaluate the following improper integral. To earn full credit, you must correctly use limits in your answer.

$$\int_{-\infty}^{\infty} \frac{(tan^{-1}(x))^2}{x^2 + 1} dx$$

5. Does the following integral converge or diverge. Carefully justify your answer using inequalities and citing relevant theorems.

$$\int_0^1 \frac{tan^{-1}(x)}{x^{\frac{1}{3}}}\,dx$$

6. (10 pts) Find the volume of the solid obtained by rotating the region bounded by the circle of radius 1 centered at $(2, 0)$ about the y-axis.

7. (10 pts) Find the volume of the solid obtained by rotating the region bounded by $y = x^2$, $y = -\sqrt{x} + 2$ and the x-axis about the x-axis.