Math 107 Practice Exam 1

Show all work. How you get your answer is just as important, if not more important, than the answer itself.

1. (10 pts. each) Find the following indefinite integrals:

(a) $\displaystyle\int \text{Arcsin}(x)\ dx$

(b) $\displaystyle\int \frac{x^2}{\sqrt{1-x^2}}\ dx$

2. (15 pts.) Find the following definite integral:

$$\int_1^3 \frac{x}{(x+1)(x+5)}\ dx$$

3. (20 pts.) Find the volume of the region obtained by revolving the region under the graph of $f(x) = \sin x$ from $x = 0$ to $x = \pi$ around the y-axis (see figure).

4. (15 pts.) Find the improper integral $\displaystyle\int_2^\infty \frac{1}{x(\ln x)^3}\ dx$.

5. (15 pts.) If we were to compute an approximation to the integral $\displaystyle\int_0^3 \sin(2x)\ dx$ using the Trapezoidal Rule, using $n = 6$ subintervals, how close to the correct answer can we expect our answers to be?

$|\int_a^b f(x)\ dx - M(f,n)| \le K\frac{(b-a)^3}{24n^2}$ $\qquad$ $|\int_a^b f(x)\ dx - T(f,n)| \le K\frac{(b-a)^3}{12n^2}$

6. (15 pts.) Set up, **but do not evaluate**, the integral which will compute the arclength of the graph of $y = x\sqrt{1+x^2}$ from $x = 0$ to $x = 3$.