

On front of your bluebook, write your NAME and a GRADING TABLE.

**SHOW YOUR WORK:** Correct answers with no work shown will receive no credit!

Incorrect answers with correct work shown will receive partial credit. *When determining convergence or divergence, state clearly what test you are using.*

1. (20 points)

(a) Simplify the following expression:  $2 \cosh(\ln x)$

(b) Find  $\frac{dy}{d\theta}$  for  $y(\theta) = \frac{1}{2} \ln(\sec^2 \theta)$

2. (30 points) Evaluate the following integrals. If an integral is improper, determine whether it converges or diverges.

(a)  $\int_0^2 \frac{1}{(z-1)^2} dz$

(b)  $\int_0^\infty \frac{1}{e^x + x} dx$

(c)  $\int_2^3 \frac{3t^2 + 2}{t^3 - t^2} dt$

(d)  $\int \frac{dv}{v^2 \sqrt{1+v^2}}$

(e)  $\int_0^1 \tan^{-1}(y) dy$

3. (25 points) Consider the region that is bounded above by  $y = \sqrt{x}$ , below by the x-axis and to the right by the line  $x = 1$ . This region is rotated about the line  $y = 2$ . Find the **volume of this solid**.

4. (25 points) Find the **area of the region** that is bounded below by  $y = 1$ , to the left by  $y = 3x + 1$ , and to the right by  $y = 5 - x^2$ .

5. **EXTRA CREDIT** (5 points) Find  $\int \csc x dx$

♣ GOOD LUCK! ♣

