QUIZ 2 **SECTION 209**

Problem 1. *Determine whether the sequence* $a_n = \sin\left(\sqrt[n]{\pi^{209+n}}\right)$ *converges or diverges. If it is convergent, find the limit.*

Problem 2. *Determine whether the series*

$$\sum_{n=1}^{\infty} \sqrt[5]{\frac{n^2}{n^2+20n+9}}$$

is convergent or divergent. It it is convergent, find the sum.

Problem 3. *Find the exact area of the surface of revolution obtained by rotating the curve* $x = 1 + 2y^2,\ 2 \leq y \leq 3$ *about the* x*-axis.*

Problem 4. *Use the Integral Test to determine whether the series* $\sum_{n=1}^{\infty} n^2 \pi^{-n^3}$ *is convergent or divergent.*

Problem 5. *Determine whether the series*

$$\sum_{n=1}^{\infty}\left(\frac{1}{n^2+5n+6}+\frac{2}{e^{n+1}}\right)$$

is convergent or divergent. It it is convergent, find the sum.

A Few Standard Integrals

(1) $\int a^x \, dx = \frac{a^x}{\ln a} + C;$

(2) $\int \sec^2 x \, dx = \tan x + C;$

(3) $\int \csc^2 x \, dx = -\cot x + C;$

(4) $\int \tan x \, dx = \ln|\sec x| + C;$

(5) $\int \cot x \, dx = \ln|\sin x| + C;$

(6) $\int \sec x \, dx = \ln|\sec x + \tan x| + C;$

(7) $\int \csc x \, dx = -\ln|\csc x + \cot x| + C;$

(8) $\int \frac{1}{x^2+a^2} \, dx = \frac{1}{a}\tan^{-1}(\frac{x}{a}) + C;$

(9) $\int \frac{1}{\sqrt{a^2-x^2}} \, dx = \sin^{-1}(\frac{x}{a}) + C, \quad a > 0.$

Formula for the Area of a Surface of Revolution

$$A_f([a,b]) = \int_a^b 2\pi f(x)\sqrt{1+[f(x)']^2}\, dx$$