MATH 31B SECTION 2
SECOND PRACTICE MIDTERM

Problem 1. Evaluate the definite integral

$$\int_0^{\pi/2} \sin^2 x \cos 2x \, dx.$$

Problem 2. Find the limit

$$\lim_{x \to 0^+} x^x.$$

Problem 3. Use a trigonometric substitution to evaluate the definite integral:

$$\int_0^1 \frac{x^2}{\sqrt{1-x^2}} dx.$$

Problem 4. Evaluate the definite integral

$$\int_0^1 \frac{r^2}{\sqrt{1+r^2}} dr.$$

Problem 5. Sketch the graph of the function $f(x) = \ln\left(\sin^2 x\right)$. Indicate the limits at infinity, vertical asymptotes, maxima, minima and inflection points. Please use the coordinate axes drawn below.

Problem 6. Use integration by parts to evaluate the definite integral

$$\int_0^1 \frac{r^3}{\sqrt{4+r^2}} dr.$$