MATH 3160-001

EXAM I

Instructions:. There are 4 problems worth 15 points each. Show your work for full credit. Only scientific calculators are allowed. You may use one side of an 8.5 by 11 inch sheet of notes.

1. Find all solutions of $32z^5 - 1 = 0$.

2. Let R be the region in the plane defined by polar coordinates: $1 \leq r \leq 2$, $\pi/4 \leq \theta \leq \pi/2$. Let $f(z) = \text{Log}(z)$. Express f in terms of it's real and imaginary parts. Find and sketch the region onto which R is transformed by $f(z)$.

3. Let $f(z) = (x^2 + y) + (y^2 - x)i$. At what points is f complex differentiable? Find $f'(z)$ at those points.

4. Find all solutions of $\cot(z) = 2i$. (Recall that $\cot(z) = \frac{\cos(z)}{\sin(z)}$)