

**MATH 264 — PROBLEMS USING COMPLEX NUMBERS AND QUATERNIONS FOR  
HOMEWORK 2**

These problems are to be turned in with Homework 2.

- (1) Put the following complex numbers into polar for  $re^{i\theta}$ ,

(a)  $z = 1 + i$ .

(b)  $z = -\sqrt{3} - i$

- (2) Prove that  $\cos(\pi/12) = \frac{\sqrt{3}+1}{2\sqrt{2}}$  and  $\sin(\pi/12) = \frac{\sqrt{3}-1}{2\sqrt{2}}$  using Euler's Formula.

(Hint: Consider  $\frac{e^{i\pi/3}}{e^{i\pi/4}}$ .)

- (3) Let  $\vec{v} = i + j + k$  and  $\vec{w} = -i + 2j$ .

(a) Compute  $\vec{v} \times \vec{w}$  using the determinant trick.

(b) Compute the  $\vec{v} \times \vec{w}$  using the identity

$$\vec{v} \times \vec{w} = \frac{1}{2} (\vec{v}\vec{w} - \vec{w}\vec{v})$$

where the multiplication on the right hand side is quaternion multiplication.