Math 1613 - Trigonometry

Quiz #24 - 2011.11.10

Solutions

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1. What is the difference between an imaginary number and a complex number?

An imaginary number is one with no real part, a complex number can have a real part. As examples, $4i$ is imaginary and complex, but $2-3i$ is not imaginary, but is complex.

2. Find a vector $\overrightarrow{v}$ of magnitude 2 perpendicular to the vector $\overrightarrow{u} = \langle 1, 2\rangle$.

So we require that $\overrightarrow{v} \cdot \overrightarrow{u} = 0$, if $\overrightarrow{v} = \langle a, b\rangle$, then this gives $a + 2b = 0$, or $a = -2b$. Furthermore, we require that $|\overrightarrow{v}| = \sqrt{a^2 + b^2} = 2$. Thus, setting $a = -2b$ in the magnitude of $\overrightarrow{v}$, we get $2 = \sqrt{4b^2 + b^2} = \sqrt{5b^2}$. Thus $b = \pm\frac{2}{\sqrt{5}}$. If we choose the positive value, then $a = -\frac{4}{\sqrt{5}}$. If we chose the negative value for b instead, we would get $a = \frac{4}{\sqrt{5}}$. Thus, our possible vectors $\overrightarrow{v}$ are given by

$$\overrightarrow{v} = \left\langle -\frac{4}{\sqrt{5}}, \frac{2}{\sqrt{5}} \right\rangle, \overrightarrow{v} = \left\langle \frac{4}{\sqrt{5}}, -\frac{2}{\sqrt{5}} \right\rangle$$