MATH 200: TEST 1

1 [3]. Sketch the surface S with equation $x^2 + y^2 - \sin z = 0$.

2 [3]. Consider the parallelogram with diagonals $\vec{v}$ and $\vec{w}$.

(a) Find the two vectors along the sides that generate the parallelogram.

(b) Find the lengths of the sides in terms of $\|v\|$, $\|w\|$ and $v \bullet w$.

3 [3]. Let the parallelepiped be generated by $\vec{u} =< 2, -1, 0 >$, $\vec{v} =< 1, 0, 3 >$ and $\vec{w} =< -1, 1, -1 >$. Thinking of the parallelogram generated by $\vec{u}$ and $\vec{v}$ as the base, find the height of the parallelepiped.

4 [2]. Let $\vec{u}$ and $\vec{v}$ be orthogonal vectors in $\mathbb{R}^3$ of length 1 and 2, respectively. Consider the vector $\vec{w} = (\vec{u} \times \vec{v}) \times \vec{u}$.

(a) Find the direction of $\vec{w}$. (One of $\pm\vec{u}$, $\pm\vec{v}$.)

(b) Find the length of $\vec{w}$.