Calculus III Quiz #1 Spring 2018 NAME: SOLUTION

1. (5 Pts) If $\vec{u} =< 3,4 >$, find a vector $\vec{w}$ that points in the direction opposite to $\vec{u}$ and that has length π.

$$\vec{w} = -\pi \frac{\vec{u}}{|\vec{u}|} = -\pi \frac{\langle 3,4\rangle}{\sqrt{9+16}} = -\frac{\pi}{5}\langle 3,4\rangle$$

$$\boxed{\vec{w} = -\frac{\pi}{5}\langle 3,4\rangle}$$

SEE SECOND PROBLEM ON REVERSE SIDE

2. **(5 Pts)** If $\vec{v} =< 1,-3 >$, $\vec{w} =< -2,3 >$ and $2\vec{v} = 3\vec{u} - 4\vec{w}$, find $\vec{u}$.

$$2\vec{v} = 3\vec{u} - 4\vec{w}$$

$$3\vec{u} = 2\vec{v} + 4\vec{w} = \langle 2-8, -6+12\rangle = \langle -6, 6\rangle$$

$$\vec{u} = \frac{2}{3}\left(\vec{v} + 2\vec{w}\right) = \langle -2, 2\rangle = 2\langle -1, 1\rangle$$

$$= \frac{2}{3}\left(\langle 1,-3\rangle + \langle -4,6\rangle\right)$$

$$= \frac{2}{3}\langle -3,3\rangle$$

$$= 2\langle -1,1\rangle$$

$$\boxed{\vec{u} = 2\langle -1,1\rangle}$$