SOLUTION KEY

Section: 34

Name & Surname: _____

Math 120 Spring 2017-2018
Quiz no.: 02
Date: 29.03.18
Time Limit: ~15 Minutes

ID Number: _____

Grade:

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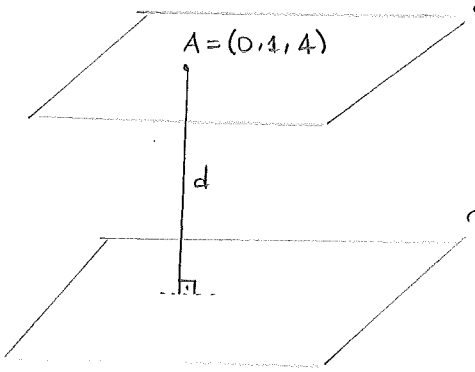
1. Find the distance between the planes

$$3x = 4y - z$$

and

$$6x - 8y + 2z = 10.$$



$\mathcal{P}_1$: $3x-4y+z=0$ with normal vector $\vec{n}_1 = \langle 3,-4,1 \rangle$

$\mathcal{P}_2$: $6x-8y+2z=10$ with normal vector $\vec{n}_2 = \langle 6,-8,2 \rangle$

Since $\vec{n}_1 \parallel \vec{n}_2$, $\mathcal{P}_1$ is parallel to $\mathcal{P}_2$, so in order to evaluate the distance between two planes, pick an arbitrary point on $\mathcal{P}_1$ and evaluate the distance between a point and a plane.

Arbitrary point on $\mathcal{P}_1$: Let $x=0$ so $A=(0,1,4)$ is on $\mathcal{P}_1$

$-4y+z=0 \Rightarrow z=4,\ y=1$

Distance between A and $\mathcal{P}_2$: $d = \dfrac{|6.0 - 8.1 + 2.4 - 10|}{\sqrt{6^2+8^2+2^2}} = \dfrac{10}{\sqrt{104}} = \dfrac{5}{\sqrt{26}}$