In green are the homework problems on which each quiz problem was modelled.

Math 253 Calculus III Fall 2018 **Quiz # 0, 28 Aug 2018**

Name: Solutions

There are 20 points possible on this quiz. This is a closed book quiz and closed note quiz. Calculators are not allowed. If you have any questions, please raise your hand.

1. Let $A(3,-2,4)$ and $B(1,2,5)$ be points in $\mathbb{R}^3$.

§12.1#39

(a) Find $|AB|$, the distance between the points A and B.

$$|AB| = \sqrt{(3-1)^2+(-2-2)^2+(4-5)^2} = \sqrt{4+16+1} = \sqrt{21}$$

§12.1#12

(b) Find the distance from point A to the xz-plane.

$|-2| = 2$

(c) Find the distance from point A to the x-axis.

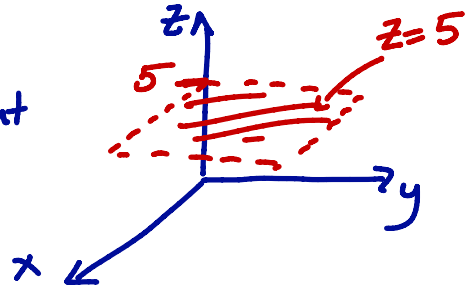
$C=(3,0,0)$

$|AC| = \sqrt{0^2+2^2+4^2} = \sqrt{20} = 2\sqrt{5}$

§12.1# 5,6

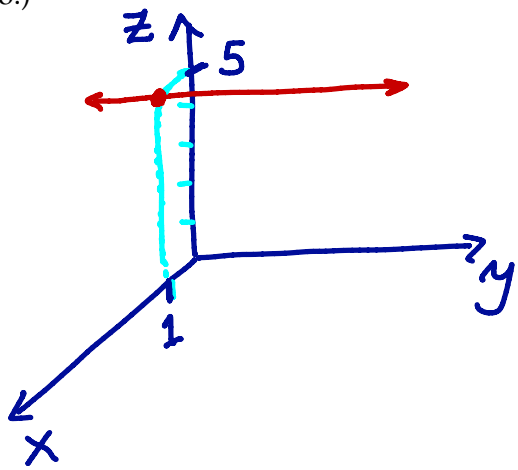
2. (a) Describe the surface in $\mathbb{R}^3$ represented by the equation $z = 5$. (You may provide a sketch if you like but you are not required to do so.)

(horizontal) plane. parallel to xy-plane but shifted up 5 units



(b) Describe the set of points (x, y, z) in $\mathbb{R}^3$ such that $z = 5$ and $x = 1$. (You may provide a sketch if you like but you are not required to do so.)

line in $\mathbb{R}^3$.
parallel to the y-axis.
The set consists of points of the form:
$(1, y, 5)$



3. (a) Find the equation of the sphere with center $(-3, 1, 6)$ and radius 3. §12.1 #13, 14

$(x+3)^2 + (y-1)^2 + (z-6)^2 = 9$

(c)

(b) What is the intersection of these sphere and the yz-plane?

yz-plane means $x=0$

So $(y-1)^2 + (z-6)^2 = 0$.

That is the point: $(0,1,6)$

(In summary, the sphere intersects the yz-plane in one point: $(0,1,6)$)

(b)

(c) What is the intersection of these sphere and the xz-plane?

XZ-plane means $y=0$

$(x+3)^2 + (z-6)^2 = 8$

The intersection is a circle with center $(-3,0,6)$ and radius $\sqrt{8} = 2\sqrt{2}$.