# Homework 2 — Tom Mulvey
2/15/18

2.14 A ) At most, one of my library books are overdue.

B ) Both of my two friends did not misplace their homework.

C ) There exists at least one person who thought that would happen.

D ) It's often that my profesor teaches that course.

E ) It is not surprising that two students recieved the same exam score.

2.34 B ) For all integers, if a given integer is odd, then the square of that integer is odd.

C ) For any integer, n, if 3n + 7 is even, then n is odd.

D ) If a given function is $f(x) = cos(x)$, then $f`(x) = -sin(x)$

F ) If a given integer, n, is even, then $n^3$ is also even.

2.76 $P(x, y, z)$: $(x-1)^2 + (y-2)^2 + (z-2)^2 > 0$

A ) For all real numbers $x, y$, and $z$, $(x-1)^2 + (y-2)^2 + (z-2)^2$ is greater than zero.

B ) $False$

Assume $\forall x, y, z \in \mathbb{R}$, $P(x, y, z)$: $(x-1)^2 + (y-2)^2 + (z-2)^2 >0$ holds true.

$let\ x = 1$, $y = 2$, and $z = 2$.

with the assumption $P(x, y, z)$ holds for all real numbers,then

$(1-1)^2 + (2-2)^2 + (2-2)^2 >0$

$\iff (0)^2 + (0)^2 + (0)^2 >0$

$\iff 0 > 0$

We have reached a contradiction.

$0 \not> 0$ ■

C ) $\exists x, y, z \in \mathbb{R}\ s.t.\ (x-1)^2 + (y-2)^2 + (z-2)^2 \leq 0$

D ) There exists a tuple, composed of x, y, and z in the Real Numbers, such that $(x-1)^2 + (y-2)^2 + (z-2)^2$ is less than or equal to zero.

E ) *True*

Assume $\neg\, P(x,y,z)$ is true.

$\iff \exists x,y,z \in \mathbb{R}\ s.t.\ (x-1)^2 + (y-2)^2 + (z-2)^2 \leq 0$

$let\ x = 1$, $y = 2$, and $z = 2$

$\iff (1-1)^2 + (2-2)^2 + (2-2)^2 \leq 0$

$\iff (0)^2 + (0)^2 + (0)^2 \leq 0$

$\iff 0 \leq 0$ ■