SOLUTIONS

MTH 311/Peszynska Quiz 1, 9/28

Name _____

Student ID # _____

1.(2 pts)

For the sets below, find the following, if possible:

	two upper bounds	three lower bounds	sup S	inf S
$S=\{-1,0\}$	1, 2	$-1, -2, -100$	0	-1
$S=\{1,2,4,8,\ldots\}$	~~X~~	$0, -1, -2$	~~X~~	1
$S=\{-1,1,-2,2,-3,3,\ldots\}$	~~X~~	~~X~~	~~X~~	~~X~~
$S=\{\frac{1}{2^n}, n=1,2,\ldots\}$	1, 2	$0, -1, -2$	$\frac{1}{2}$	0
$S=(-1,1]$	1, 2	$-1, -2, -\pi$	1	-1
$S=[-1,1]$	1, 2	$-1, -2, -e$	1	-1

2.(2 pts) For the sets below, find the following, if possible:

	two upper bounds	three lower bounds	sup S	inf S
$S=\{x\in\mathbb{R}: x^2<4x\}$	4, 5	0, -1	4	0
$S=\{x\in\mathbb{R}: x^2\le 1\}$	1, 2	$-1, -2$	1	-1

Show any work:

$x^2 < 4x$

$x>0$ and $x<4$

or $x<0$ $x>4$ (impossible)

result: $x\in(0,4)$

$|x|\le 1$

$x\in[-1,1]$

3.(2 pts) Show by mathematical induction that

$$S(n): \quad 1+3+5+\ldots+(2n-1)=n^2$$

1^0 Check: $1 \stackrel{?}{=} 1$ ✓

2^0 $S(k) \stackrel{?}{\Rightarrow} S(k+1)$

$S(k): 1+3+\ldots+(2k-1)=k^2$

$S(k+1): 1+3+\ldots+(2k-1)+(2(k+1)-1) = k^2+2k+2-1$

$= k^2+2k+1$

$= (k+1)^2$ ✓.