SN _____ ID _____ NAME _____

Show all necessary steps for full marks.

Q1. (5 points) (2.6 Exercise 27): **Graph** the piecewise-defined function.

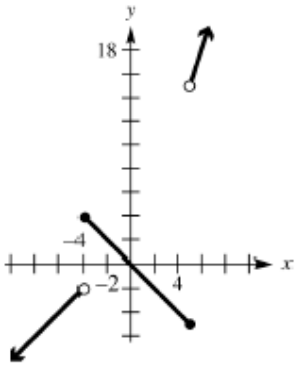
(a): Find the range.

(b): Determine the intervals where the function is decreasing.

(c): Determine the interval where the function is increasing.

$$f(x)=\begin{cases} 2+x & \text{if} \quad x<-4 \\ -x & \text{if} \quad -4\le x\le 5 \\ 3x & \text{if} \quad x>5 \end{cases}$$

Solution:



(a): $Range=(-\infty,4]\cup(15,\infty)$

(b): The function is decreasing on $[-4,5]$

(c): The function is increasing on $(-\infty,-4)$ and $(5,\infty)$

Q2. (5 points) (Recitation 2.6) If $f(x)=\left[\!\left[1-\frac{x}{2}\right]\!\right]$, sketch the graph of $f(x)$ and find

a) $x-$ and y - intercepts

b) $f(-2.4)+f(2.006)$

Solution: $n=\left[\!\left[1-\frac{x}{2}\right]\!\right]$

$$n\le 1-\frac{x}{2}<n+1$$

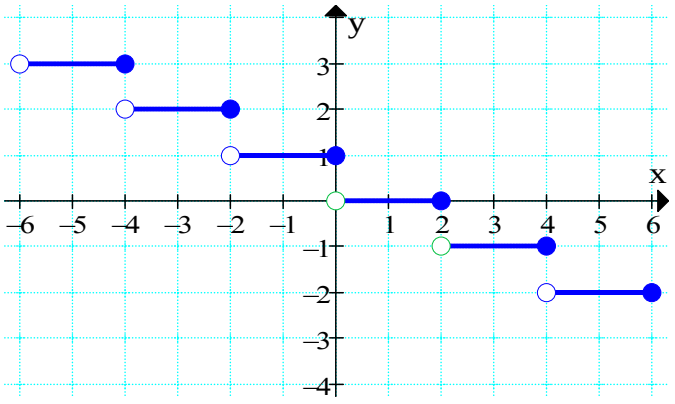
$$2n\le 2-x<2n+2$$

$$2n-2\le -x<2n$$

$$-2n+2\ge x>-2n$$

$$-2n<x\le -2n+2$$

n	$-2n<x\le -2n+2$	$f(x)=\left[\!\left[1-\frac{x}{2}\right]\!\right]$
-2	$4<x\le 6$	-2
-1	$2<x\le 4$	-1
0	$0<x\le 2$	0
1	$-2<x\le 0$	1



(a): $x-\text{int}:\ \{x\mid 0<x\le 2\}$

$y-\text{int}:\ y=1$

(b): $f(-2.4)+f(2.006)=?$

$$f(-2.4)=\left[\!\left[1-\frac{-2.4}{2}\right]\!\right]=\left[\!\left[\frac{2+2.4}{2}\right]\!\right]=\left[\!\left[\frac{4.4}{2}\right]\!\right]=[\![2.2]\!]=2$$

$$f(2.006)=\left[\!\left[1-\frac{2.006}{2}\right]\!\right]=\left[\!\left[\frac{2-2.006}{2}\right]\!\right]=\left[\!\left[\frac{-0.006}{2}\right]\!\right]=[\![-0.003]\!]=-1$$

$$f(-2.4)+f(2.006)=2-1=1$$

Q3. (5 points) (Recitation 2.7 Q#3) Determine which of the following functions are even, odd, or neither.

a) $f(x)=\dfrac{2x}{3x-x^5}$

b) $f(x)=x^4-5x+8$

c) $f(x)=x^2+|x|+4$

Solution: (a) $f(-x)=\dfrac{2(-x)}{3(-x)-(-x)^5}=\dfrac{-2x}{-3x+x^5}=\dfrac{-1}{-1}\cdot\dfrac{-2x}{-3x+x^5}=\dfrac{2x}{3x-x^5}=f(x)$

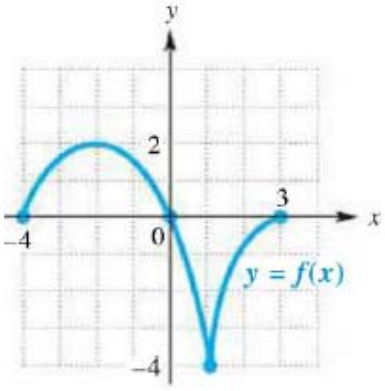
$\Rightarrow$ f is an even function.

b) $f(-x)=(-x)^4-5(-x)+8=x^4+5x+8\neq f(x)$ and $\neq -f(x)$ $\Rightarrow$ f is neither even nor odd.

c) $f(-x)=(-x)^2+|-x|+4=x^2+|x|+4=f(x)$ $\Rightarrow$ f is an even function.

Q4. (5 points) (2.7Example 9): A graph of a function defined by $y=f(x)$ is shown in adjacent figure. Use this graph to sketch each of the following graphs.

(a): $g(x)=f(x)+3$ (b): $h(x)=f(x+3)$ (c): $k(x)=f(x-2)+3$



Solution: