**King Fahd University of Petroleum and Minerals**
Prep-Year Math Program
Math (001)-Term (181)
Recitation (2. 2 and 2.3)

Question 1: Which one is TRUE about the graph of the following function?

The function is
(a) increasing on $[0,2)$ and decreasing on $(-\infty,\infty)$.
(b) increasing on $[0,2)$ and decreasing on $(-\infty,0)\cup(0,\infty)$.
(c) increasing on $(-\infty,0]\cup[2,\infty)$ and decreasing on $[0,2)$.
(d) increasing on $(-\infty,0)\cup(2,\infty)$ and decreasing on $[0,2)$.
(e) increasing on $[0,2)$ and decreasing on $(-\infty,0]\cup[2,\infty)$.
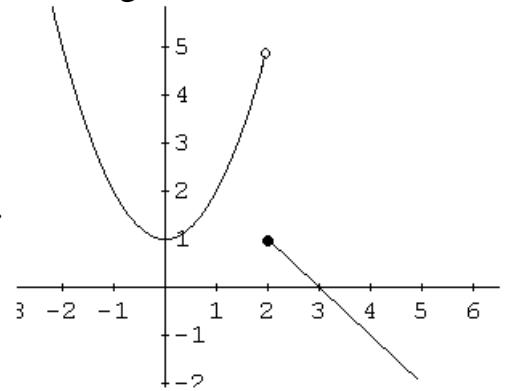
Answer: (e)

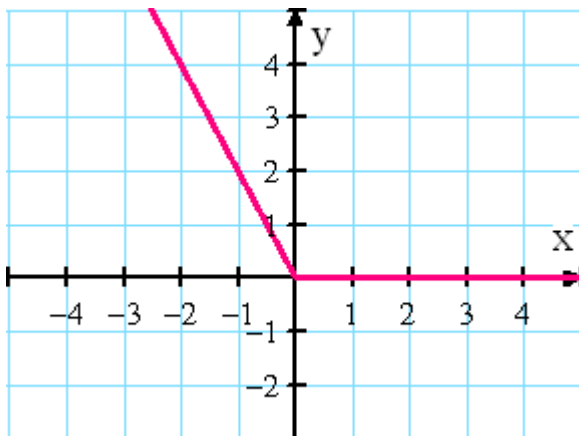**Question 2:** The equation that defines y as a function of x is
(a) $x^2 - y^2 = 0$
(b) $x - |y| = -5$
(c) $y = \pm 4$
(d) $y = \sqrt[3]{x+4}$
(e) $(x-5)^2 = 25 - (y-3)^2$

Answer: (d)

Question 3: Sketch the graph of $f(x) = |x| - x$.
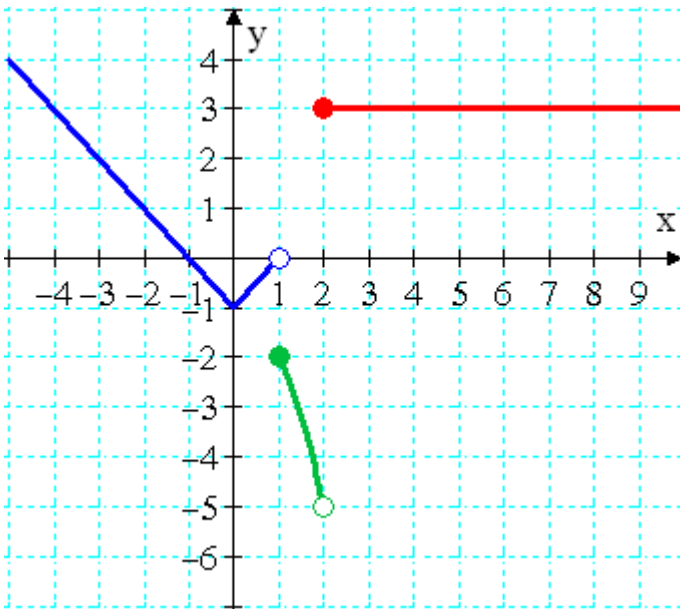
Solution: $f(x) = |x| - x$

$$= \begin{cases} x - x & \text{if } x \geq 0 \\ -x - x & \text{if } x < 0 \end{cases}$$

$$= \begin{cases} 0 & \text{if } x \geq 0 \\ -2x & \text{if } x < 0 \end{cases}$$

Question 4: Consider of the function $f(x) = \begin{cases} |x| - 1 & \text{if} \quad x < 1 \\ -x^2 - 1 & \text{if} \quad 1 \le x < 2 \\ 3 & \text{if} \quad x \ge 2 \end{cases}$

a) Graph $f(x)$

b) Find the domain and the range of this function.

c) Find $f(-3)$, $f\left(\dfrac{4}{3}\right)$ and $f(\pi)$

d) Find the $x-$intercept and $y-$intercept.

Solution (a):

Answer (b): $Domain = (-\infty, \infty)$ $\quad Range = (-5, -2] \cup [-1, \infty)$

Answer (c):
$f(-3) = |-3| - 1 = 3 - 1 = 2$

$f\left(\dfrac{4}{3}\right) = -\left(-\dfrac{4}{3}\right)^2 - 1 = -\dfrac{16}{9} - 1 = \dfrac{-16 - 9}{9} = -\dfrac{25}{9}$

$f(\pi) = 3$

Answer (d): $x-$intercept: $x = -1$, $(-1, 0)$
$ y-$intercept: $y = -1$, $(0, -1)$