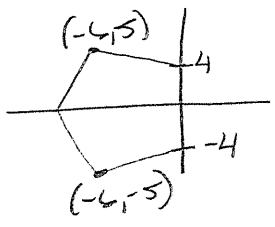


- ① a) b) (-4, -5)



- ② $(x, y) \rightarrow (-x, -y)$
 $(4, -2) \rightarrow (-4, 2)$
- ③ $(x, y) \rightarrow (-x, y)$
 $(4, -2) \rightarrow (-4, -2)$

- ④ $(4, -2) \rightarrow (4, 2)$
- ⑤ a) $(x, y) \rightarrow (-x, y)$
 $(-3, -9) \rightarrow (3, -9)$
 $y = x|x| \rightarrow y = -x|x|$
 $y = x^2 \neq y = -x^2$
 $-9 \neq 3|3|$
 $-9 \neq 9$
 Not symmetric over y-axis

- b) $(x, y) \rightarrow (x, -y)$
 $(-3, -9) \rightarrow (-3, 9)$
 $9 \neq -3|-3|$
 $9 \neq -9$
 Not symmetric over x-axis

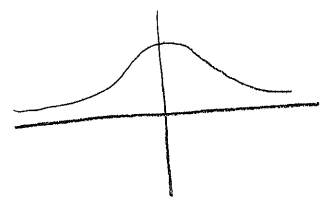
- c) $(x, y) \rightarrow (-x, -y)$
 $(3, -9) \rightarrow (-3, 9)$
 $9 \neq 3|3|$
 $9 = 9$
 yes, symmetric w/ respect to origin

- ⑥ $(x, y) \rightarrow (-x, -y)$
 $f(-x) = \frac{6}{-x} = -\frac{6}{x} = -f(x)$

- ⑦ y-axis \rightarrow yes
 $f(-x) = f(x)$
 $f(-x) = \frac{8}{2+(-x)^2}$
 $= \frac{8}{2+x^2} = f(x)$

- x-axis \rightarrow no
 $-f(x) = f(x)$
 $-f(x) = -\frac{8}{2+x^2} \neq f(x)$

- origin \rightarrow yes
 $f(-x) = -f(x)$
 $f(-x) = \frac{8}{2+(-x)^2}$
 $= \frac{8}{2+x^2} \neq -f(x)$



- ⑧ a) ii, iv b) i, iii

- ⑨ $f(x) = -246x$
odd
 $f(-x) = -f(x)$
 $f(x) = -246(-x) = 246x = -(-246x) =$
 $246x = -f(x)$ YES, ODD
EVEN $f(-x) = f(x)$
 $246x \neq -246x$ NOT EVEN

PC Sec 3-4 Cont.

10) $g(x) = \frac{1}{2}x^3 + 3$

odd
 $f(-x) = -f(x)$

$g(-x) = \frac{1}{2}(-x)^3 + 3 = -\frac{1}{2}x^3 + 3$
 $-g(x) = -(\frac{1}{2}x^3 + 3) = -\frac{1}{2}x^3 - 3$
 $-\frac{1}{2}x^3 + 3 \neq -\frac{1}{2}x^3 - 3$

Not odd

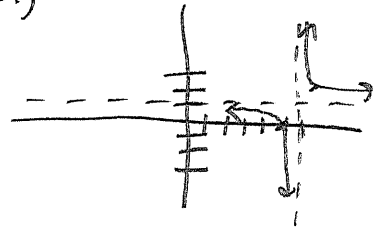
EVEN

$f(-x) = f(x)$

$g(-x) = \frac{1}{2}(-x)^3 + 3 = -\frac{1}{2}x^3 + 3 \neq \frac{1}{2}x^3 + 3$

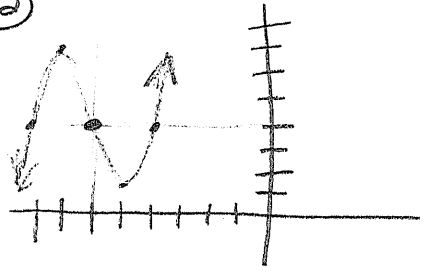
NOT EVEN

11) a)



b) $y=1$ \xrightarrow{c} up
 $x=6$ $\xrightarrow{}$ Right

12)



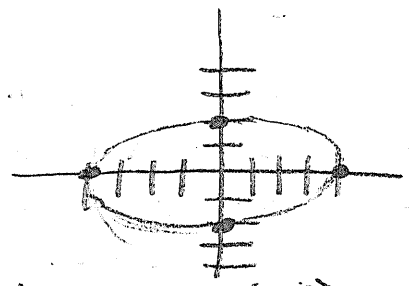
13) $f(t) = t^3 - 2 \rightarrow$ power not even

$(x, y) \rightarrow (-x, y)$

$(2, 1)$

$f(2) = 2^3 - 2 = 8 - 2 = 6 \neq 1$

14) $x^2 + 4y^2 = 16$



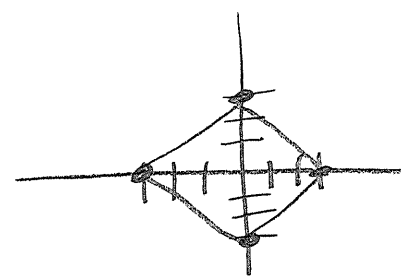
All symmetric

$(-x, y) : (-x)^2 + 4y^2 = x^2 + 4y^2 = 16$

$(x, -y) : (x)^2 + 4(-y)^2 = x^2 + 4y^2 = 16$

$(-x, -y) : (-x)^2 + 4(-y)^2 = x^2 + 4y^2 = 16$

15) $|x| + |y| = 3$



All symmetric

$(-x, y) : |-x| + |y| = 3$

$|x| + |y| = 3$

$(x, -y) : |x| + |-y| = 3$

$|x| + |y| = 3$

$(-x, -y) : |-x| + |-y| = 3$

$|x| + |y| = 3$

16) $x^2 + y^2 = 9$

x-axis

y-axis

$(x, y) \rightarrow (x, -y)$

$(x, y) \rightarrow (-x, y)$

$x^2 + (-y)^2 = 9$

$(-x)^2 + y^2 = 9$

$x^2 + y^2 = 9$

$x^2 + y^2 = 9$

origin

$(x, y) \rightarrow (-x, -y)$

$(-x)^2 + (-y)^2 = 9$

$x^2 + y^2 = 9$