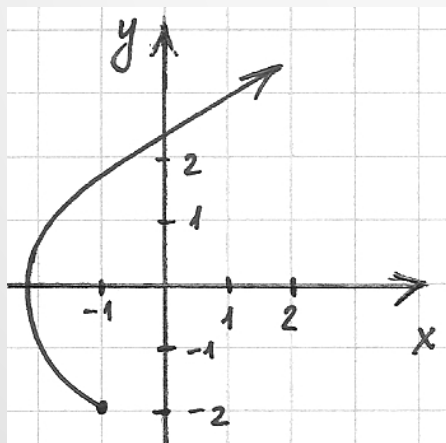# Midterm Exam Preparation

1. List by letter all relations that are not functions. Provide brief explanation.

(a) { (1,7), (2,3), (4,2), (1,4), (7,1) }

(b) $x^3 - y^3 = 10$

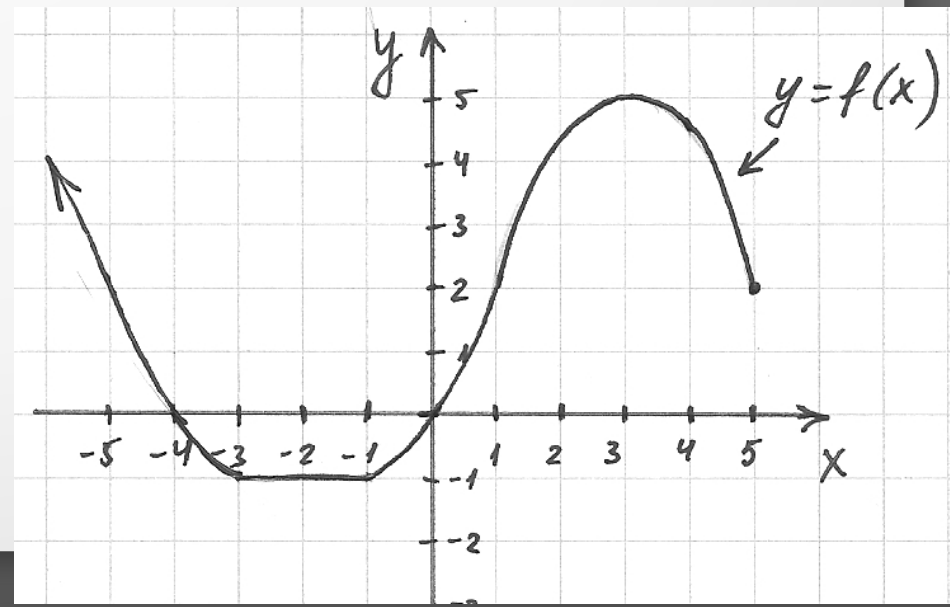(c)

2. Use the graph to answer the questions

(a) find the value(s) for *x* at which *f(x)* = 2.
(b) at which *x* does *f* has a *relative maximum* ?
    what is the *relative maximum* ?
(c) on which interval(s) is *f* increasing ?
(d) on which interval(s) is *f decreasing* ?
(e) does *f* have an *inverse function*?
(f) what are the *x*-intercepts?
(g) what is the *y*-intercept?
(h) what is the *domain* of *f*?
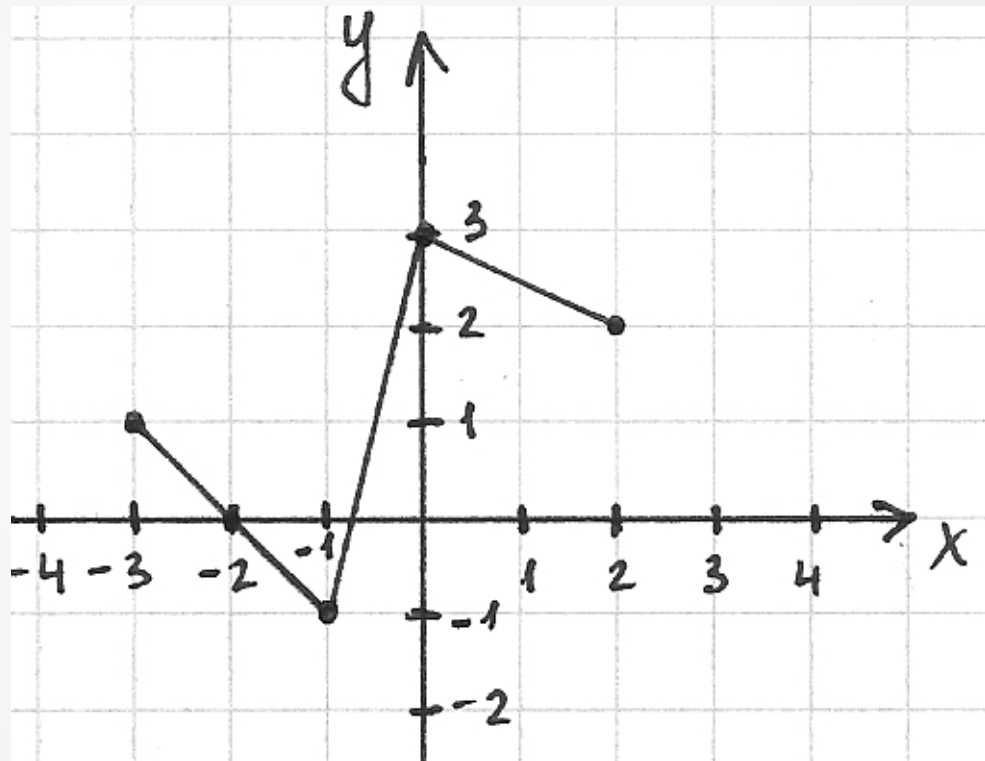(i) what is the *range* of *f*?
(j) is *f even*, *odd* or neither?

3. Given the graph of a function *f(x)*. Graph the given functions.

(a) *f(x+3)*

(b) *-f(x)+2*

(c) *f(2x)*

4. Let $f(x)=2x-1$, and $g(x)=4x^2-2x$

Find and simplify where possible. Give their domain for (a) - (d).

(a) $(g-f)(x)$

(b) $\left(\dfrac{g}{f}\right)(x)$

(c) $(f \circ g)(x)$

(d) $(g \circ f)(x)$

(e) $(f \circ g)(4)$

(f) $\dfrac{f(x+h)-f(x)}{h}$

5. Find the domain of each function:

(a) $f(x) = \dfrac{3}{x^2 + x - 12}$

(b) $g(x) = \sqrt{x-3} + \sqrt{2-x}$

(c) $h(x) = \dfrac{\sqrt{x+5}}{x^2 - 9}$

6. Find the inverse function of $f(x) = 2 - 5x$

7. Determine without graphing, whether the quadratic function

$$f(x) = -2x^2 + 12x - 8$$ has an *absolute minimum* or an *absolute maximum* value, find it.

8. Determine the *end behavior* of the graph of the polynomial function $f(x) = 5x^4 - x^6 - 12x$

9. For the polynomial function $f(x) = x^3 - 5x^2 - 25x + 125$ find its *zeros* and give *multiplicity of each zero*.
Hint: use grouping method

10. Solve the inequality $\dfrac{x-3}{x+5} \leq -2$