First set of Homework

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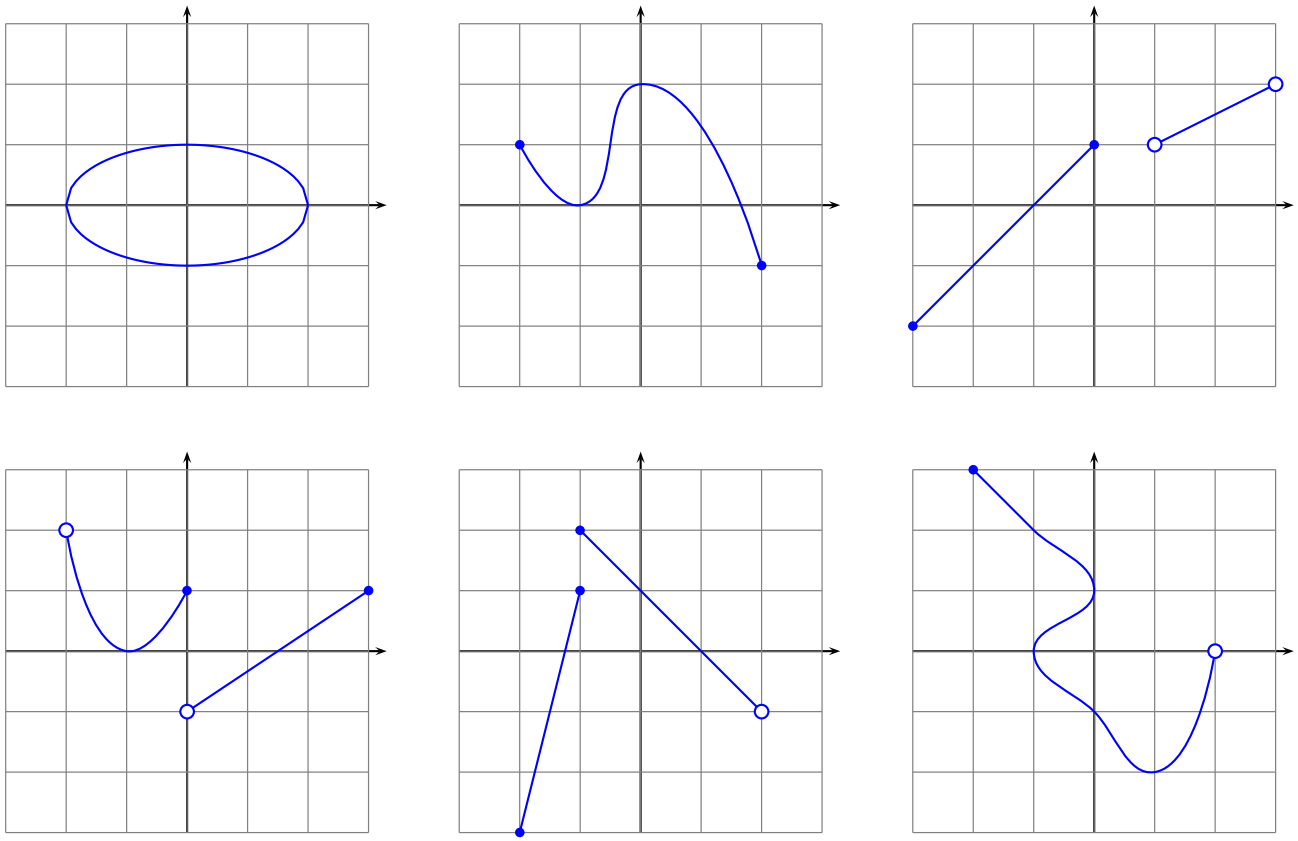
Please note: You should fully justify your answers.

1 Fucntions their domains, ranges, and graphs

1. Find the domain and range of the relations whose graphs are shown bellow. Which of those graphs are graphs of functions?



2. Find the domain of the following functions:
   (a) $f(x) = \sqrt{x-5}$
   (b) $g(x) = \sqrt[3]{5x-10}$
   (c) $f(x) = \dfrac{2x-3}{4x+5}$
   (d) $f(x) = \dfrac{x^2-1}{x^2+4x-5}$
   (e) $h(x) = \dfrac{2x}{\log_2 x}$

(f) $g(x) = \dfrac{3}{2x-4} + \sqrt{3x-7}$

(g) $f(x) = \log_3(5x-2)$

(h) $f(x) = \sqrt{1-x^2}$

(i) Extra Credit: $g(x) = \sqrt{x^2+x-2}$

3. Find the range of the following functions:

(a) $f(x) = 6$

(b) $h(x) = -5x+1$ with domain $(-2, 6\,]$

(c) $f(x) = \dfrac{3}{2-x}$

(d) $g(x) = 3 - x^2$

(e) $f(x) = -\sqrt{x}$

(f) $f(x) = \sqrt{1+x}$

(g) $g(x) = 1 + \sqrt{x}$

(h) $g(x) = x^3$

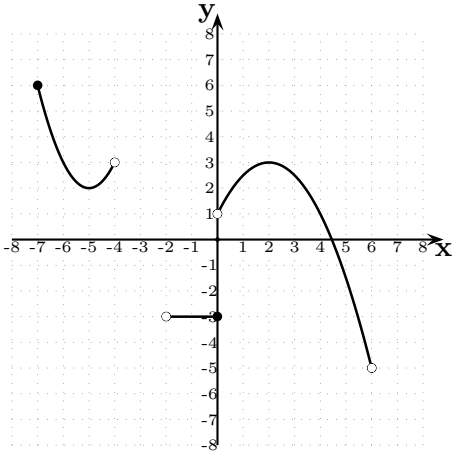
(i) $f(x) = 5^x$

(j) $h(x) = \log_4 x$

(k) Extra Credit: $f(x) = \dfrac{2x-1}{3x+4}$

(l) Extra Credit: $g(x) = x^2 + 2px + c$ where p and c are real numbers.

4. Use the graph of the function f shown to find



(a) The domain of f.

(b) The range of f.

(c) The interval(s) where f is increasing.

(d) The interval(s) where f is decreasing.

(e) The interval(s) where f is constant.

(f) The relative maxima of f.

(g) The relative minima of f.

5. Extra Credit: Graph (using a graphical calculator or a Computer Algebra System) the following functions:

(a) $y = x^3 - x^2 - 4x + 4$

(b) $y = \cos x$

(c) $y = \sin x^2$

(d) $y = \dfrac{x}{x^2+1}$

(e) $y = \dfrac{x}{x^2-1}$

Use the graphs to determine the intervals in which the given functions are increasing or decreasing.