Precalculus Pretest A: Chapter 1

1. Relations, Functions and One-to-One Functions
   a) Draw a graph of a relation that is at best
      (i) a relation (whose inverse is not a function)
      (ii) a relation (whose inverse is a function)
      (iii) a function
      (iv) a one-to-one function

   b) Why does the vertical line test to see if a relation is a function?

   c) Explain in words why the horizontal line test tests whether or not a function is a one-to-one function.

2. Explain the graphical significance of algebraically switching x and y in order to determine the equation of the inverse of a function.

3. Determine the inverses of the following functions:
   a) $f(x) = 3x + \frac{1}{3}$
   b) $g(x) = x^2 + 10x$
   c) $h(x) = x^2 + 10x - 3$
   e) $f^{-1}(x) = -2x^2 + 5x - 3$
   f) $g^{-1}(x) = \dfrac{4}{5 - 2x}$
   g) $h^{-1}(x) = 4 - \sqrt{3x - \sqrt{2}}$

4. If $f(a) = b$, state the coordinates of the point as an ordered pair on
   a) $y = f(x)$
   b) $y = f^{-1}(x)$
   c) $y = f(-x)$
   d) $-y = f(\frac{1}{3}x)$
   e) $\frac{2}{3}y = f(x + 1)$
   f) $y - 2 = f(-4x)$
   g) $y = \frac{1}{5}f(3x)$
   h) $y = f(-x) - 6$
   i) $y - k = f(cx)$
   j) $dy = f(x - h)$
   k) $by = f(ax)$
   l) $y = f(sx) + t$

   Before determining the coordinates, state the type of transformations (HR, VR, HS of #, VS of #, HT of #, VT of #).

5. Given $f(x) = x - 5$ and $g(x) = 2x + 1$, evaluate
   a) $f(3)$
   b) $g(-\frac{1}{2})$
   c) $f^{-1}(-2)$
   d) $g^{-1}(0)$
   g) $f^{-1}(4)$
   h) $g^{-1}(-\frac{\pi}{5})$

6. Determine the symmetry of the following. Use proper "proof" format.

a) $f(x) = 4x^3 + \pi x - \sqrt[5]{2x}$

b) $f^{-1}(x) = 3x^{100} - \frac{5}{4} + x^{-2}$

c) $f(x) = \frac{\sqrt{|x|} + \sqrt[3]{x^2}}{x}$

d) $f(x) = \frac{1}{x^2 - x}$

e) $f(x) = \frac{3x}{5 - x^2}$

f) $h(x) = \frac{x^{-1} - x^{\frac{1}{3}}}{x^2 - x^{-2}} - 2$

7. Determine the domain of each function.

a) $y = 3 - 5x$

b) $y = x^2 - 4$

c) $y = -2x^2 - 8x$

d) $y = \sqrt{-x}$

e) $y = \sqrt{5x - \frac{\sqrt{3}}{7}}$

f) $y = \sqrt{x^2 - 4}$

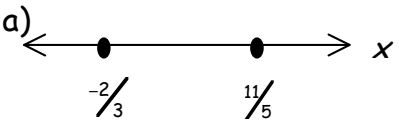
g) $y = \frac{x^2 - 9}{x - 3}$

h) $y = \frac{x - 3}{x^2 - 9}$

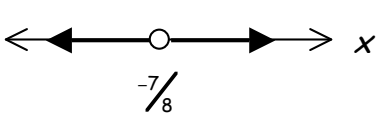
i) $y = \sqrt[4]{\frac{x^2 + 3x + 2}{4 - x^2}}$

8. Express the graphs as absolute value equations/inequalities (without fractions):

a)



b)



c)