MATH 1007 B, Tutorial 1 (Solution)

Question 1. [6] Find the domain of each one of the following functions.

(a) $f(x) = \dfrac{x-2}{x^2-4}$

Solution: First simplify the function (always!) $f(x) = \dfrac{x-2}{x^2-4} = \dfrac{1}{x+2}$. So, $Domain(f) = (-\infty, -2) \cup (-2, \infty)$.
Or $Domain(f)$ = all of the real number excluding -2 OR $x \neq -2$

(b) $f(x) = 3 + \dfrac{x^2}{x^2+1}$
Solution: $Domain(f) = (-\infty, \infty)$
(c) $f(x) = x^3 + 235$
Solution: Since f is a polynomial $Domain(f) = (-\infty, \infty)$

Question 2. [4] Find the range of functions in Parts (b) and (c) of Question 1.
Solution: For $f(x) = 3 + \dfrac{x^2}{x^2+1}$, $Range(f) = [3, 4)$
For $f(x) = x^3 + 235$, $Range(f) = (-\infty, \infty)$

Question 3. [6] For each one of the following functions specify the interval over which the function is increasing and the interval over which it is decreasing.

(a) $f(x) = -\dfrac{1}{x^2}$
Solution: f is increasing on $(0, \infty)$ and it is decreasing on the interval $(-\infty, 0)$. Note f is not not defined for $x = 0$
(b) $f(x) = x^3 - 1$
Solution: f is increasing on $(-\infty, \infty)$

Question 4. [9] Which ones of the following functions are Odd and which ones are Even? Also identify which one is symmetric about the $y-$axix and which one is symmetric about the origin $(0, 0)$.

(a) $f(x) = x^2$
Solution: f is EVEN therefore, symmetric about y-axis
(b) $g(x) = x^{-3}$
Solution: g is ODD therefore, symmetric about $(0, 0)$
(c) Define the function $h(x) = f(x).g(x)$. Is $h(x)$ odd or even?
(write the formula of $h(x)$ first)
Solution: $h(x) = \frac{1}{x}$ and it is an ODD function therefore, symmetric about $(0, 0)$