

Math 450 Winter 2017

Homework #5

You don't need to return the question with * sign.

- (*) Read 17.11 and 18.1-18.2
- (1) Exercises 17.6 Questions 1 and 2a, 2c, 2d, 2g
- (2) Exercises 17.6 Questions 4
- (3) Exercises 17.7 Question 1b,c,d,e, and Question 3
- (4) Exercises 17.7 Question 8
- (5) Exercises 17.9 Questions 2b,c,d,e, and Question 4
- (6) Exercises 17.10 Questions 1, 2 and 4. Note $H(x)$ is the Heaviside function which is defined by

$$H(x) = \begin{cases} 0, & x < 0 \\ 1, & x \geq 0 \end{cases}$$

- (7) Let f, g be a smooth integrable function defined on \mathbb{R} . In this question we want to find out what happens to the F.T. of f if we dilate/compress f by a positive value a and vice versa. Define

$$f_a(x) = f(ax), \quad g_b(x) = g(bx)$$

- (a) Using the definition of FT, calculate FT of f_a in terms of \hat{f} ?
- (b) Explain what happens to graphs of f_a and its FT as a increases, and as a decreases.
- (c) In order to answer this part only use the result you find in (a) and the linearity of FT and its inverse. Let \check{g} denote the inverse FT of g , and $b > 0$. What is the inverse FT of g_b in terms of \check{g} ?