

# Math 477, Homework 6, due 4/6/06

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**You are required to read Sections 6.4 and 6.5 before Tuesday class.**

**You are required to hand in any 12 of the following problems.**

**At least one has to be a theoretical exercise.**

**The solutions should be clearly written explanations, not just numbers.**

**Problems from the book:**

Chapter 6 – Problems: 1, 4, 7, 8, 11, 14, 15, 17, 20, 22, 26, 28, 29, 31, 32, 36, 45.

Chapter 6 – Theoretical Exercises: 5, 10, 11, 14.

Problems 26 and 45 are each two problems worth. Hint for Theoretical Exercise 10: first solve Theoretical Exercise 9.

**Problem 1:** A continuous random variable  $X$  has a cumulative distribution function given by  $F_X(x) = c \arctan(x)$  for  $x \geq 0$ , and 0 otherwise. Find the value of  $c$ . Find the probability density function  $f_X(x)$ . Find the expected value of  $X$ .

**Problem 2:** Assume  $X$  and  $Y$  are two independent continuous random variables, where  $X$  is exponential with parameter  $\lambda = 2$ , and  $Y$  has density function  $f_Y(y) = y/6$  for  $2 \leq y \leq 4$  (it is 0 elsewhere). Let  $Z$  be the random variable  $Z = X + Y$ . Find  $P(4 \leq Z \leq 6)$ .