There are two problems from the book and two additional problems. Want more practice? Do more problems from the book, or see me.

Exercise 8.26 (about $A = UV$)

Exercise 8.27 (about a third independent exponential random variable)

A. Let $X, Y \sim \text{Expo}(\lambda)$ be independent, and let $Z = Y/X$. What is the PDF of Z?

This last problem is about a continuous random variable T with PDF $f(t) = \dfrac{1}{\pi(1+t^2)}$ on support $(-\infty, \infty)$. Notice that f is symmetric about $t = 0$, in that $f(t) = f(-t)$.

B.A. What is the CDF of T? (By the way, the back of my calculus textbook says that $\int \frac{1}{a^2+u^2}\, du = \frac{1}{a} \arctan\left(\frac{u}{a}\right) + C$.)

B.B. Check that the PDF integrates to 1.

B.C. Intuitively, what should the expectation of T be?

B.D. What happens, when you compute the expectation of T?

B.E. What happens, when you compute the variance of T?