Homework 3

Due by
Tuesday 26 September 2017 17:00

The Fisher LSD $F_{s,t}$ is the distribution with the density function

$$p_{s,t}(x) = \frac{1-t}{2\pi x(s+tx)}\sqrt{(b-x)(x-a)}, \quad a \le x \le b,$$

with

$$a = a(s,t) = \frac{(1-h)^2}{(1-t)^2}, \quad b = b(s,t) = \frac{(1+h)^2}{(1-t)^2}, \quad h = h(s,t) = (s+t-st)^{1/2}.$$

Question 1 [2 marks]
Show that the first moment

$$\int x\, p_{s,t}(x)\, dx = \frac{1}{1-t}.$$

Question 2 [2 marks]
Show that the second moment

$$\int x^2\, p_{s,t}(x)\, dx = \frac{h^2+1-t}{(1-t)^3}.$$

Question 3 [1 marks]
Show that the variance equals $h^2/(1-t)^3$.