Assignment 4

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Problem 1

(a)

$$F_x(X) = P\{X \le x\} \tag{1}$$
$$= P\{s\tan A + \theta \le x\} \tag{2}$$
$$= P\left\{A \le \arctan\frac{x-\theta}{s}\right\} \tag{3}$$
$$= (\arctan\frac{x-\theta}{s} + \frac{\pi}{2})\frac{1}{\pi} \tag{4}$$
$$\tag{5}$$

So:

$$F'_x(X) = \frac{1}{s\pi(1 + \frac{x-\theta}{s})} \tag{6}$$
$$= \frac{1}{s}\kappa(\frac{x-\theta}{s}) \tag{7}$$
$$= f_x \tag{8}$$

(b)

```
Ths <- seq(-30, 10, 0.2)
Ss <- seq(.2, 40, .2)

Xs <- c(1,2,7.8,9.2)

likefcn <- function(th, s){
```

```
    return(prod(1/(pi*s*(1.0+((Xs-th) / s)^2)))))
}

m <- length(Ss)
n <- length(Ths)
liks <- matrix(0, nrow=m, ncol=n)
for(i in 1:m){
  for(j in 1:n){
    liks[i, j] = likefcn(Ths[j], Ss[i])
  }
}
length(liks)

40200
```
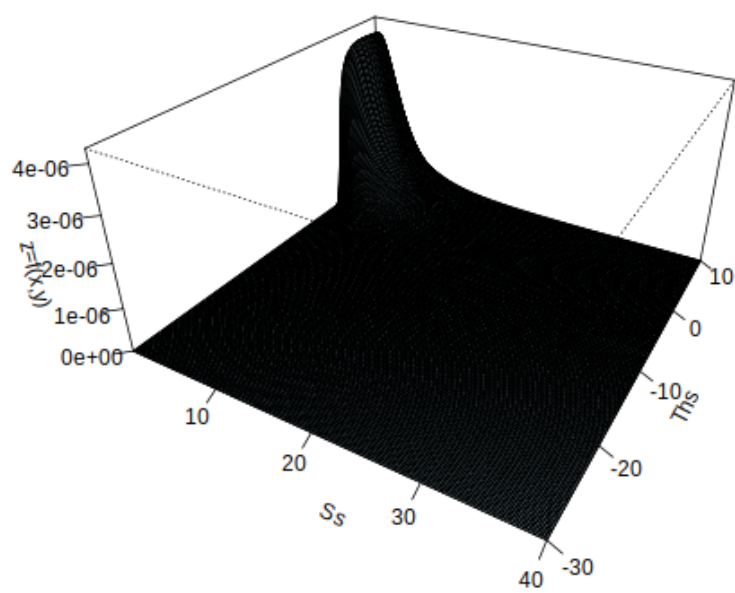
(c)

```
persp(Ss,Ths, liks, theta=30, phi=30, expand=0.5,
col="lightblue", zlab="z=f(x,y)",
ticktype="detailed",
shade=.75, lphi=45, ltheta=135)
```

Sorry this is all I had time to do ;_;