Homework 1 (part 1)

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Problem 1

#i.

```
# build f(x1,x2) function
f <- function(x1,x2){
  cos(x1*x2)
}
```

#ii.

```
# build h(x1,x2) function
h <- function(x1,x2){
  1 - pi^2*(x1^2)/8
}
```

#iii.

```
# build the sequences
x <- seq(-pi/4,pi/4,length = 30)
y <- seq(pi/4,3*pi/4,length = 30)
grid <- expand.grid(x = x, y = y)

fxy <- f(grid$x,grid$y)
hxy <- h(grid$x,grid$y)
```

```
# plot the functions
plot3d(grid$x,grid$y,fxy,type = "surface")

surface3d(x,y,fxy, color = "red", add = TRUE)
surface3d(x,y,hxy, color = "lightblue", add = TRUE)
```

#iv.

STUCK! maybe just copy/paste the code again and edit the plot3d()

```
#adding labels
title3d(main="Taylor Approximation")
axes3d(xlab = "x_1")
axes3d(label = "x_2")
```

#v.

```
#build error function
e <- function(x1,x2) {
  abs(f(x1,x2) - h(x1,x2))
}
```

```r
# plot the function
exy <- e(grid$x,grid$y)

plot3d(x,y,exy, type="surface")
surface3d(x,y,exy, color = "red", add = TRUE)
```