Laplace of Gaussian

Task 9.1

a) Derive the *Laplace of Gaussian* Filter. The output function is:

$$w(r) = -e^{-\frac{r^2}{2\sigma^2}}$$

with σ as the standard deviation. Keep in mind the chain rule and product rule for the derivation.

b) Implement the function that generates and save the following LoG Filter:

$$\nabla^2 w(x,y) = \frac{2\sigma^2-(x^2+y^2)}{\sigma^4} e^{-\frac{x^2+y^2}{2\sigma^2}}$$

with σ as the standard deviation. Create the filter with the following sizes: 5×5 by $\sigma = 1$, 11×11 by $\sigma = 3$ and 21×21 by $\sigma = 3$.

c) Implement the alternative function which is same as the LoG filter but consists of multiple filters. In this case, make use of the given filters i.e. Laplace (*laplace.mask*) and Gauss (*gauss.mask*).

d) Test the above functions for the given image *mond_noise.bmp*.

For loading and saving from masking filters, make use of the following functions:

`void loadFilterMask (string filename, GrayImage &mask)`
    Load the filter mask from the file `<filename>` and store them in the `<mask>` for the given image

`void saveFilterMask (GrayImage &mask, string filename)`
    Save the given filter mask as a `<mask>` in the file `<filename>`

The methods like `filter(...)`, `scale(...)` und `abs(...)` are already imeplemented in previous exercises and are already available in the source code of the following exercises.