

# Abgabe - Übungsblatt [3]

Angewandte Mathematik: Numerik

[Felix Lehmann]

[Markus Menke]

24. November 2020

## Aufgabe 1

Here comes your text ...

## Aufgabe 2

And some more text ...

## Aufgabe 3

a)

```
def ComputeTPSWeights(X, Y, Z):
    m = X.shape[0]
    A = np.zeros(shape=(m, m))
    for i in range(m):
        vi = np.array([X[i], Y[i]])
        for j in range(m):
            vj = np.array([X[j], Y[j]])
            r = np.linalg.norm(vi-vj)
            A[j, i] = (r**2) * np.log(max(1.0e-8, r))
    w = np.linalg.solve(A, Z)
    return w
```

b)

```
def EvaluateTPSSpline(XNew, YNew, X, Y, Weights):
    if (len(XNew.shape) > 1):
        XNew = XNew[0, :]
    if (len(YNew.shape) > 1):
        YNew = YNew[:, 0]
    m = XNew.shape[0]
    res = np.zeros(shape=(m, m))
    for ix in range(m):
        for iy in range(m):
            tmp = 0
            for j in range(len(Weights)):
                wj = Weights[j]
```

```

        r = np.linalg.norm(np.array([XNew[ix]-X[j]
                                     ],YNew[iy]-Y[j])))
        tmp += Weights[j] * ((r**2) * np.log(max
        (1.0e-8,r)))
        res[iy, ix] = tmp
    return res

```