1 $[2,1]^t$

2(a) 1.8000, **2(b)** 1.0000, **2(c)** -2, -4, **2(d)** 0.8000, **2(e)** 1.0000

3(a) $\lambda_1 = -4,\ \lambda_2 = 3,\ \lambda_3 = -2$, $\mathbf{u}_1 = [-\frac{1}{\sqrt{2}},\ \frac{1}{\sqrt{2}}, 0]^t$, $\mathbf{u}_2 = [0,0,1]^t$ $\mathbf{u}_3 = [\frac{1}{\sqrt{2}},\ \frac{1}{\sqrt{2}}, 0]^t$,

3(b) $\sum_{i=1}^{3} \lambda_i \mathbf{u}_i \mathbf{u}_i^t$.

3(c) $\sigma_1 = 4,\ \sigma_2 = 3,\ \sigma_3 = 2$

3(d) $\sum_{i=1}^{3} \sigma_i \mathbf{u}_i \mathbf{v}_i^t$, where $\mathbf{v}_1 = -\mathbf{u}_1$, $\mathbf{v}_2 = \mathbf{u}_2$, and $\mathbf{v}_3 = -\mathbf{u}_3$

3(e) `[U,D]=eig(A), A=U*D*U'` and `[U,S,V]=svd(A), A=U*S*V'`

4(d) $H = I - 2\mathbf{u}\mathbf{u}^t$, where $\mathbf{v} = \mathbf{x} - \mathbf{y}$, and $\mathbf{u} = \mathbf{v}/\|\mathbf{v}\|_2$

5 Show that $A^m \mathbf{v}_j = \lambda_j^m \mathbf{v}_j$.

6 Refer to the classnotes.