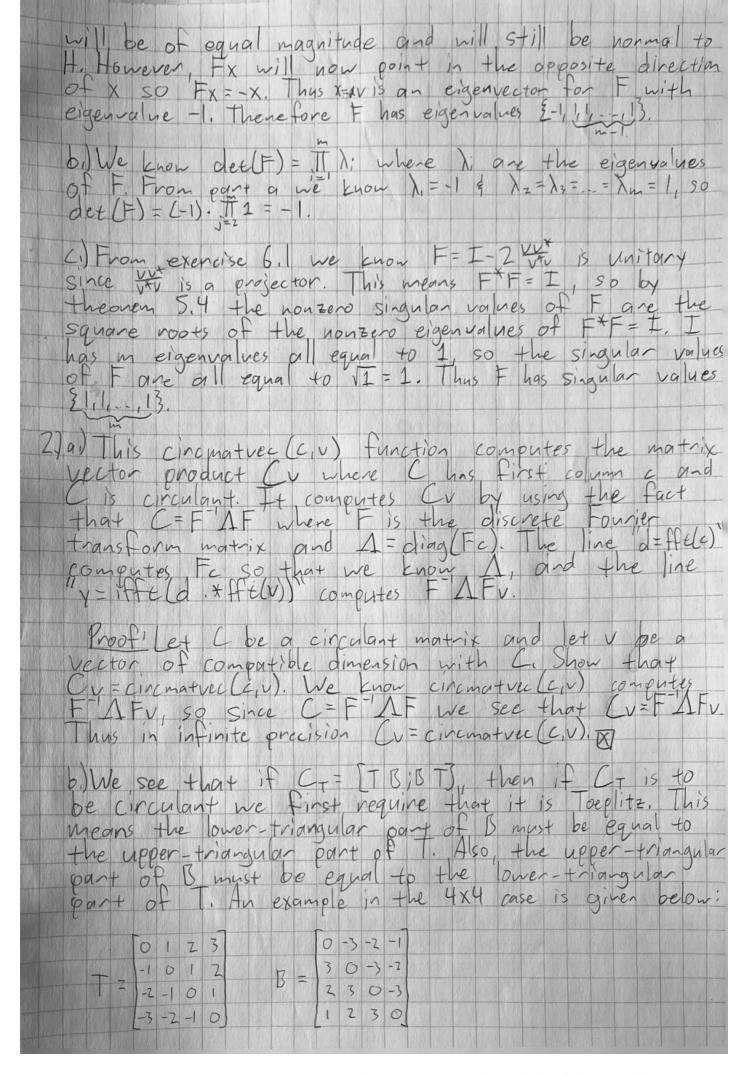
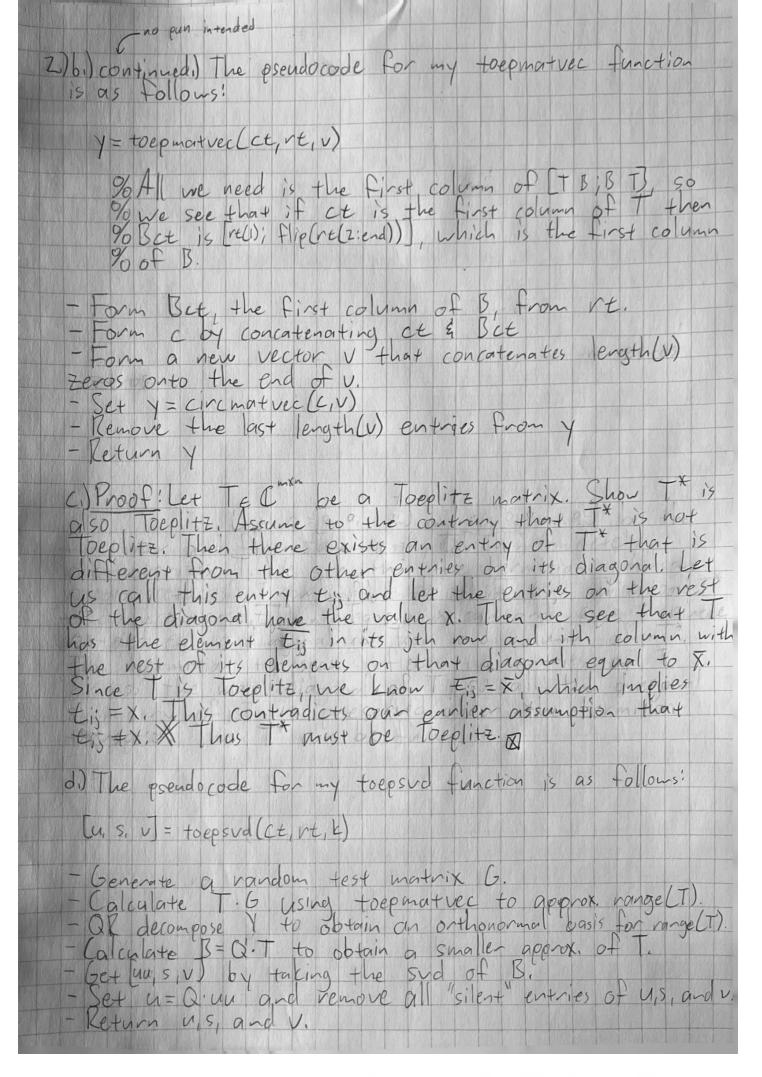
Justin Hexem AMATH 584 Homework #4 10:11) The Householder reflector FEC is given by F= I-2 viv a) Find the eigenvalues of F. Let XEC and let B= {\vec{v}, h_2,h_3,...,h_m} be an orthonormal basis of C where h_2,h_3,...,h_m \in H \(\vec{v} = ||v||_2. \) Then X= \(\vec{d}_1 \vec{v} + \vec{d}_2 h_2 + \vec{d}_3 h_3 + ... + \vec{d} m h_m. \) This means Fx = F(div + dzhz + dzhz + dzhz + - + anha) = Fdiv + Fazhz + Fazhz + -- + Fanhn = a, Fû + dz Fhz + dzhz + -- + du Fhn = d1 111/12 (V-2 V VV) = 0, 111/12 (V-2V) = 0, 111/12 (-V) = d(-V) = 0, (-3) \Rightarrow $\lambda_1 F \hat{v} = \lambda_1 (-\hat{v}) \Rightarrow F \hat{v} = -\hat{v} \Rightarrow \lambda_1 = -1$ let Z = 1 = m. Then a; Fh; = a; (I - 2 vox)h; = a; (h; - 2 vox h) = a; (h; - 2 vox) = d; (h; -0) = xh; $\Rightarrow \alpha_i \vdash h_i = \alpha_i \cdot h_i \Rightarrow h_i = h_i \Rightarrow \lambda_i = 1$ Therefore F has eigenvalues 2-1, 1, 1, ..., 13. Geometrically, we see that Freflects a vector x across
the hyperplane It with normal vector v. If XEH, then
the reflected vector Fx will remain the same after the
reflection F is applied so Fx=x. It has dimension m-1, so
every basis vector of I has eigenvalue 1. It X#H, then
x=dv for some de C. Since VIH, the reflected vector Fx

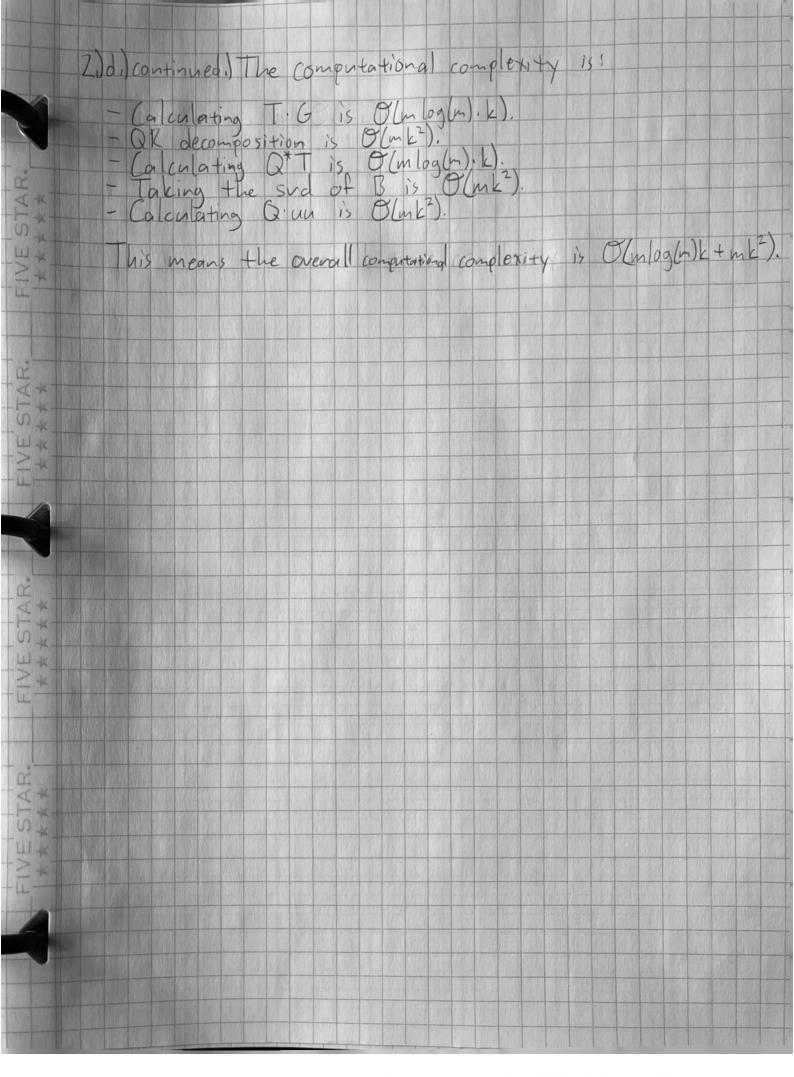
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```
>> Problem2d
rk =
    80
totalTimeToepSVD =
    0.2509
totalTimeSVD =
    3.1840
Error =
   7.8245e-15
```