Assignment 1

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September 16, 2016

1

2

2.a

The solution that I found by hand is similar but not the same as the one returned by qr function in Matlab. Two of the axis directions are flipped but it does form a orthonormal basis.

2.b

To find the gram matrix I wrote the following function:

```
function G = findGram(M)

n = size(M, 2);
G = zeros(n,n);
for i=1:n
    for j=1:n
      G(i,j) = M(:, i)' * M(:, j);
    end
end
```

2.c

To find a rank k version of matrix I wrote the following function.

```
function M = rankk(A, k)

M = zeros(size(A));
[U,S,V] = svd(A);
sigma = diag(S);

for i=1:k
        M = M + sigma(i) * U(:, i) * V(:, i)';
end
```

For $A_{(2)}$ the two norm and the frobenius norm both return the same value.

$$||A - A_{(2)}||_2 = 0.55921$$
$$||A - A_{(2)}||_F = 0.55921$$