MATH 5603 Homework 2

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Problem 2

Cholesky's Algorithm Inner Product Form

```
A = [
16,4,8,4;
4,10,8,4;
8,8,12,10;
4,4,10,12
];

n=size(A,1);

[A,ispositivedef] = Cholesky(A);
triu(A)
```

```
ans = 4×4
     4     1     2     1
     0     3     2     1
     0     0     2     3
     0     0     0     1
```

```
function [A,ispositivedef] = Cholesky(A)
    n = size(A,1);
    assert(n==size(A,2)); % Make sure we're operating on nxn
    ispositivedef = true;
    for i = 1:n
        if i~=1 % Skip when i==1
            for k=1:i-1
                A(i,i)=A(i,i)- A(k,i)^2;
            end %k
        end
        if A(i,i)<= 0
            ispositivedef = false;
            A=nan;
            return
        end
        A(i,i) = sqrt(A(i,i)); % R_{i,i}

        %Skip j loop when i==n
        if i==n
            continue
        end
        for j=i+1:n
            %Skip k loop when i=1
```

```
            if i~=1
                for k = 1:i-1
                    A(i,j) = A(i,j) - A(k,i)*A(k,j); %dot prod part
                end
            end
            A(i,j)= A(i,j)/ A(i,i); %R_{i,j}
        end %j
    end %i
end
```

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