CSS 455 Winter 2012 C. Jackels
Activity No. 4 January 11, 2012
Names (must be present):

Part 1.

$$y_i = \sum_{k=1}^{n} a_{ik} x_k$$

- Given the matrix-vector product
  y = Ax
  where **y** is an $(r \times 1)$ column vector, **x** is an $(n \times 1)$ and **A** is an $(r \times n)$ matrix, write pseudo code for a suitable algorithm.
- Estimate in terms of r and n the number of floating point operations (multiplies, additions and subtractions) in this algorithm.

Part II
Given the algorithm for the row-ordered matrix vector product:

```
%compute the Ax product
y = zeros(m,1);
for i = 1:m
   y(i) = 0;
   for j = 1:n
      y(i) = y(i) + A(i,j)*x(j);
   end
end
```

$$\begin{pmatrix} a_{11} & a_{12} & a_{13} & a_{14} & a_{15} & a_{16} \\ 0 & a_{22} & a_{23} & a_{24} & a_{25} & a_{26} \\ 0 & 0 & a_{33} & a_{34} & a_{35} & a_{36} \\ 0 & 0 & 0 & a_{44} & a_{45} & a_{46} \\ 0 & 0 & 0 & 0 & a_{55} & a_{56} \\ 0 & 0 & 0 & 0 & 0 & a_{66} \end{pmatrix}$$

Modify as needed for the case where **A** is *upper triangular*

See reverse side

Part III

$$C_{kj} = \sum_{i=1}^{r} A_{ki} B_{ij}$$

- Given the matrix-matrix product

  C=AB

  where **A** is an ($m \times r$) matrix, **B** is an (r × n) matrix and **C** is an ($m \times n$) matrix write pseudo code for a suitable algorithm.
- Estimate in terms of *m*, *n*, and *r* the number of floating point operations (multiplies, additions and subtractions) in this algorithm.

See reverse side