CSCE 441 Refsheet

Geometry

Vector

- angle between vectors a and b: $\theta = \cos^{-1} \frac{a\dot{b}}{|a||b|}$
- dot product (scalar product): $a\dot{b} = a_x b_x + a_y b_y + a_z b_z$ `a . b = a_xb_x + a_yb_y + a_zb_z`
  - represented here with period
  - properties:
    - `a . a = |a|^2`
    - `a . b = b . a` comutativity
    - `a . (b+c) = a . b + a . c` distributive
    - etc...
- cross product (vector product): $a \times b = [+(a_y b_z - a_z b_y)i - (a_x b_z - a_z b_x)j + (a_x b_y - a_y b_x)k]$

Matrix

- multiplying any matrix by the identity matrix yields the original matrix

```
A + B = B + A
A + ( B + C ) = ( A + B ) + C
b ( A + B ) = b A + b B
( b + d ) A = b A + d A
b ( d A ) = ( bd ) A = d ( b A )
```

- transpose: swap rows and columns
- product of A and B:
  - matrixes are indexed like `matrix(row, column)` (just like matlab)
  - defined iff (number of colums in A) == (number of rows in B). That is, `size(A) == [m n] && size(B) == [n p]`
  - for result matrix `C`, each element defined as: `C(i,j) = A(i,1)*B(1,j) + A(i,2)*B(2,j) + ... + A(i,n)*B(n,j)`
  - properties:

```
( AB ) C = A ( BC )
A ( B + C ) = AB + AC
( A + B ) C = AC + BC
A ( k B ) = k ( AB ) = ( k A ) B
```

- determinant of A is sometimes written |A|