**Analytic Trigonometry** **Unit 10 Readings:**

**Vectors**

Vector quantities "vectors" - both magnitude and direction (N 5 mph)

Scalar quantities "scalars" - only magnitude (5 mph)

Directed line segment - from initial point to terminal point PQ

**Magnitude** = length || PQ || = distance from P to Q

Vectors denoted by boldface letters: **v** **w**

**v** = **w** same magnitude same magnitude different magnitude

 different direction opposite direction same direction

**Magnitude** of a vector **v** (distance between initial point (*x*1,*y*1)

and terminal point (*x*2,*y*2): || **v** || = $\sqrt{\left(x\_{1}-x\_{2}\right)^{2 }+ \left(y\_{1}-y\_{2}\right)^{2 }}$

**Direction** can be shown by slope: m = $\frac{y\_{1}-y\_{2}}{x\_{1}-x\_{2}}$ if $x\_{1}-x\_{2}$≠0

**Scalar multiplication** k**v**: positive real numberchanges the

magnitude |k| ||**v**|| but not the direction; negative points

it in the opposite direction

**Vector addition** **u** + **v**



Vector subtraction **u** - **v**

**Plotting vectors**

 vector **i** is the unit vector whose direction is along the positive *x*-axis

 vector **j** is the unit vector whose direction is along the positive *y*-axis

 vector **v** from (0,0) to (a,b): **v** = a **i** + b **j**

 a and b are the scalar components of **v**

 a is the horizontal component, b is the vertical component

 **v** = a **i** + b **j** is a linear combination of **i** and **j**

||**v**|| = 

**Scalar multiplication:**

 k**v** = (ka) **i** + (kb) **j**

**Position vector** –

 if **v** doesn't start at (0,0):

 **v** = (x2 – x1) **i** + (y2 – y1) **j**

**Writing a vector in terms of its magnitude and direction**

magnitude ||**v**|| direction angle *θ*

**v** = ||**v**||(cos *θ* **i** + sin *θ* **j**)

**The Dot Product** - multiplying two vectors

 **v** = a1 **i** + b1 **j**

**v ● w** = a1 a2+ b1 b2

 **w** = a2 **i** + b2 **j**

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Vectors

compute properties of a vector

vector {2, -5, 4}

specify a vector as a linear combination of unit vectors

vector 3i + 5j

vector 2i - 4j + 3k

Vector Algebra

do vector computations

vector (1,3,-1) + (-2,1,6)

7 {1, 0, -2, 1} - 4 {2, -1, 1, -1}

(i + j + k) + (2i - 3j + 8k)

compute a dot product

{12, 20} . {16, -5}

(7i-j+3k).(4i-2k)

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