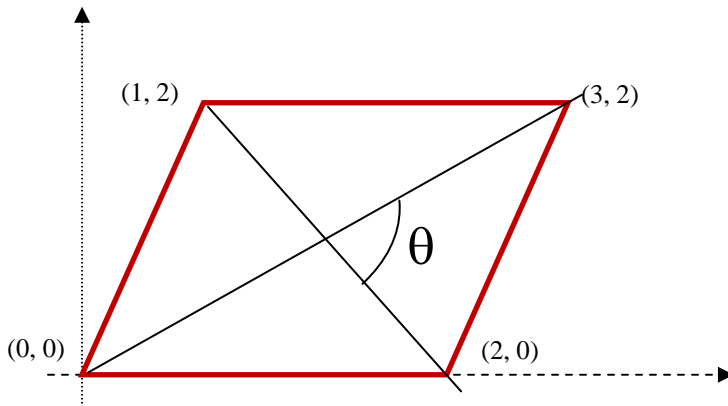


**Take-home Quiz #2**  
**Math 213-002**  
**Due February 7, 2014**

**Show all work for each problem**

- Find the amount of work done by a constant force  $\mathbf{F} = \langle 1, 3 \rangle = \mathbf{i} + 3\mathbf{j}$  when it moves an object around a unit square with vertices at  $(0, 0)$ ,  $(1, 0)$ ,  $(1, 1)$ ,  $(0, 1)$ , in the counter-clockwise direction. Hint: find work on each of the four straight sub-intervals, and add up these four numbers.
- Use vector algebra to find the cosine of the angle between the two diagonals of the following parallelogram lying in the  $xy$ -plane (i.e. find  $\cos \theta$ ):



- Find the point of intersection of the lines  $\mathbf{r}_1(t) = \langle 0, 2, 1 \rangle + t \langle 1, -1, 1 \rangle$ , and  $\mathbf{r}_1(t) = \langle 2, 3, 6 \rangle + t \langle 2, 1, 5 \rangle$ , and write down the equation of plane that contains these two lines

**Calculus review problem:**

4. (a) Differentiate:  $f(x) = \cos(xe^{\sin x})$

(b) Integrate:  $\int_e^{e^2} \frac{dx}{x \ln x}$