EXERCISES #5

LINES AND CURVES

Exercise 1. Find the parametric equations for the following implicit equations (in 2D). Use the parameter t.

(1) $(x-5)^2+(y-4)^2=16$.
(2) $x+2y=1$.
(3) $2x^2+y^2=3$.

Exercise 2. Find the implicit equations for the following parametric equations (in 2D).

(1) $\langle x,y\rangle=\langle\cos t+\sin t,\cos t-\sin t\rangle$
(2) $\langle x,y\rangle=\langle\cos t+2\sin t+1,\sin t+2\rangle$

Exercise 3. Find the parametric equations for the following lines (in 3D).

(1) The line through the points $(1,2,6)$ and $(2,4,8)$.
(2) The line through the points $(2,3,1)$ and $(1,-3,-6)$.

Exercise 4. Find the angle between the line through $(-2,4,0)$ and $(1,1,1)$ and the line through $(2,3,4)$ and $(2,-1,-8)$.

Exercise 5. Determine whether the following pairs of lines (in 3D) are parallel, intersecting or skew. If they intersect, find the point of intersection.

(1) $L_1: x=2-3t, y=3+2t, z=t$
$L_2: x=-1+s, y=5+7s, z=1-6s$
(2) $L_1: x=5+t, y=2+t, z=-t-1$
$L_2: x=s-1, y=s-2, z=6-s$
(3) $L_1: x=t, y=1, z=-t-1$
$L_2: x=4-s, y=s+1, z=s+3$
(4) $L_1: x=4-5t, y=-t+1, z=t+1$
$L_2: x=2s+1, y=s-1, z=s+1$

Exercise 6. True or False:

(1) In 2D, two lines orthogonal to a third line are parallel.
(2) In 3D, two lines orthogonal to a third line are parallel.
(3) In 2D, two lines orthogonal to a third line are orthogonal.
(4) In 3D, two lines orthogonal to a third line are orthogonal.
(5) In 2D, two lines either intersect or are parellel.
(6) In 3D, two lines either intersect or are parellel.
(7) In 2D, two lines parallel to a third line are parallel.
(8) In 3D, two lines parallel to a third line are parallel.