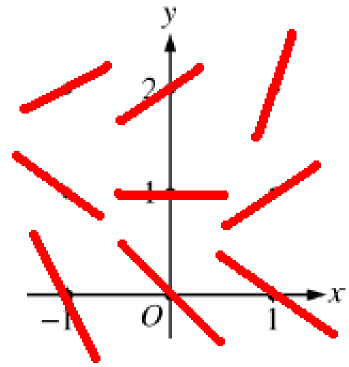
2007 Form B AB5

A.

coordinate	slope
(1,0)	- ½
(1,1)	½
(1,2)	-1
(0,1)	0
(-1,0)	- 3/2
(-1,1)	½
(-1,2)	½



B.

$$\frac{d^2y}{dx^2}=\frac{1}{2}+\frac{dy}{dx}$$
$$=\frac{1}{2}+\frac{1}{2}x+y-1$$
$$=-\frac{1}{2}+\frac{1}{2}x+y$$

For f to be concave up the second derivative of f must be positive therefore

$$\frac{d^2y}{dx^2}=-\frac{1}{2}+\frac{1}{2}x+y>0$$
$$y>\frac{1}{2}-\frac{1}{2}x$$

This describes a half plane above the line

$$y=\frac{1}{2}-\frac{1}{2}x$$

C. We know that f(0)=1 We know to the left of this point the function is decreasing and to the right of this point the function is increasing (based upon the slopefield.) Therefore the function f has a relative minimum at the point (0,1).

Alternatively: Since we know that the point (0,1) is in this half plane so the second derivative at (0,1) is positive. We can also see that at this point $\frac{dy}{dx}=0$. So this tells us that there is a minimum at (0,1).

D. If y = mx + b then $\frac{dy}{dx}=m$.

Substituting these in the differential equation yields:

$$m=\frac{1}{2}x+(mx+b)-1$$
$$\left(m+\frac{1}{2}\right)x+(b-m-1)=0$$

For this to be true

$$m+\frac{1}{2}=0 \ \ and \ \ b-m-1=0$$
$$m=-\frac{1}{2} \ and \ b+\frac{1}{2}-1=0 \ or \ b=\frac{1}{2}$$

Alternatively:

$$\frac{d^2y}{dx^2}=-\frac{1}{2}+\frac{1}{2}x+y=0$$
$$y=\frac{1}{2}-\frac{1}{2}x$$

This says m = -½ and b = ½ .