Math Document Template

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***Abstract*—This is a simple document explaining how to get equation of line that passes through a particular point in a particular direction.**

Download all and latex-tikz codes from

```
svn co https://github.com/gadepall/school/trunk/
    ncert/geometry/figs
```

1 Problem

Find the equation of the line that passes through $(2\ -1\ 4)^T$ and is in the direction $(1\ 2\ -1)^T$

2 Solution

2.1. The figure for the straight lines obtained in the question looks like Fig. 2.2. The line at the direction of $(1\ 2\ -1)^T$ is represented by $\mathbf{b}$ and the line that passes through $(2\ -1\ 4)^T$ is represented by $\mathbf{a}$.

2.2. Generating the points and the straight lines using python.
Solution: The following Python code generates Fig. 2.2

```
codes/line_Eqn1.py
```

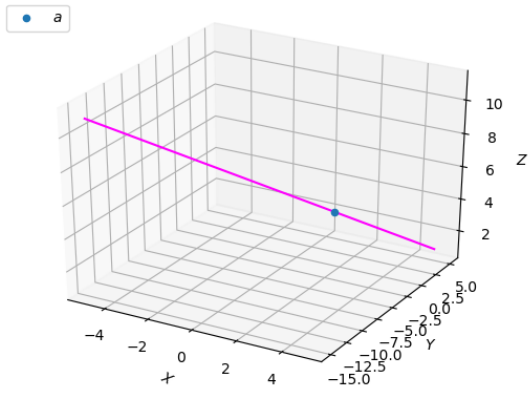

Fig. 2.2: The Straight line passing through a point at a particular direction

As the line at the direction of $(1\ 2\ -1)^T$ is represented by $\mathbf{b}$, so $\mathbf{b}$ is the direction vector and the point is $\mathbf{a} = (2\ -1\ 4)^T$ through which the line passes through.
From the problem statement, we got:

$$\mathbf{a} = \begin{pmatrix} 2 \\ -1 \\ 4 \end{pmatrix} \tag{2.1}$$

So, let us consider another point P with $\mathbf{r} = (x\ y\ z)^T$ on the line that passes through $\mathbf{a}$.

$$\mathbf{r} = \mathbf{a} + \lambda\mathbf{b} \tag{2.2}$$