Q1. Convert to simple English sentences

i)

$$\pi_{sname}($$
$$\quad \pi_{sid}($$
$$\quad\quad (\sigma_{tagname='PPE'} ProductTag) \bowtie (\sigma_{cost<6} Catalog)$$
$$\quad) \bowtie Suppliers$$
$$)$$

Get the names of the suppliers that have PPE that costs less than 6.
[Outputs the suppliers that have products tagged with 'PPE' and a cost of less than 6]

ii)

$$\pi_{sname}($$
$$\quad \pi_{sid}($$
$$\quad\quad (\sigma_{tagname='PPE'} ProductTag) \bowtie (\sigma_{cost<6} Catalog) \bowtie Suppliers$$
$$\quad)$$
$$)$$

Nothing is returned from this operation.
[$(\sigma_{tagname='PPE'} ProductTag) \bowtie (\sigma_{cost<6} Catalog)$ returns the products with tag PPE and cost ¡ 6, columns are: tid, pid, tagname, sid, pid, cost. Natural join with supplier looks at common sid, so that returns the suppliers with products of tag PPE and cost ¡ 6. Projecting sid will result in each tuple only having an sid. Projecting the sname of a table where the tuples have only sid results in nothing being returned.]

iii)

$$\pi_{sname}($$
$$\quad (\sigma_{tagname='PPE'} ProductTag) \bowtie (\sigma_{cost<6} Catalog) \bowtie Suppliers$$
$$) \cap \pi_{sname}($$
$$\quad (\sigma_{tagname='SuperTech'} ProductTag) \bowtie (\sigma_{cost<6} Catalog) \bowtie Suppliers$$
$$)$$

Gets the names of the suppliers that offer PPE made by SuperTech that costs less than 6.

iv)

$$\pi_{sid}($$
$$\quad (\sigma_{tagname='PPE'} ProductTag) \bowtie (\sigma_{cost<6} Catalog) \bowtie Suppliers$$
$$) \cup \pi_{sid}($$
$$\quad (\sigma_{tagname='SuperTech'} ProductTag) \bowtie (\sigma_{cost<6} Catalog) \bowtie Suppliers$$
$$)$$

Gets the supplier IDs of suppliers that offer PPE or (inclusive) SuperTech products, both having a cost less than 6.