**אלגברת היחסים**

1. σquantity>0 (book)
2. σstatus=0 (orders)
3. σ(customers)
4. σ(supplier)
5. σorder\_date between ‘2018-03-04’ and ‘2018-06-28’ (orders)
6. σ(book)global\_discount=1
7. σtitle=’book11’ and quantity>0 (book)
8. πsb.supplier\_id,s.name,sb.book\_id (σ(b.title=’book9’) ∧ ( b.book\_id=sb.book\_id) ∧ ( s.supplier\_id=sb.supplier\_id) (ρsb(supplier\_books) x ρb(book) x ρs(supplier)))

option 2:

πsb.supplier\_id,s.name (( ρs(supplier))⋈s.supplier\_id=sb.supplier\_id((ρsb(supplier\_books))⋈b.book\_id=sb.book\_id ∧ b.title=’book1’(ρb(book))))

1. πsum(od.quantity) (σo.order\_date>=’2018-08-22’((ρo(orders))⋈o.order\_id=od.order\_id((ρb(book)) ⋈ b.book\_id=od.book\_id ∧ b.title=’book8’ (ρod(orderDetails)))))
2. πsum(od.quantity) (σo.order\_date>=’2018-08-22’((ρod(orderDetails))⋈o.order\_id=od.order\_id ∧ c.customer\_id=3((ρc(customers) )⋈ o.customer\_id=c.customer\_id(ρo(orders)))))
3. πc.first\_name,c.last\_name (σc.customer\_id=x.customer\_id τ x.pay DESC LIMIT 1(ρc (customers))⋈(ρx(πo.customer\_id,ρpay(SUM(od.quantity))(σo.order\_id=od.order\_id ∧ o.order\_date>=’2018-05-24’ γ o.customer\_id( ρod(orderDetails) X ρo(orders))))))
4. πs.supplier\_id,s.name,x.cost ((ρs(supplier))⋈s.supplier\_id=x.supplier\_id τ x.cost DESC LIMIT 1(ρx(πp.supplier\_id,ρcost (SUM(p.quantity))(σp.purchase\_date>=’2018-05-24’ γ p.supplier\_id (ρp(purchase))))))
5. πbook.title,COUNT(purchase.book\_id) (σ(book.book\_id=purchase.book\_id) ∧( purchase\_date BETWEEN ‘2018-05-13’ ∧ ‘2019-010-22’) γ purchase.book\_id (purchase X book))
6. πCOUNT(status)(σstatus=1 ∧ order\_date BETWEEN ‘2018-05-13’ ∧ ‘2019-010-22’ (orders))
7. πtotal,ρdiscount(IF(total>1000,total\*0.1,’no discount’))((ρt(πsum(x.total)ρtotal (σo.customer\_id=2 ∧ o.order\_date>=’2018-06-07’ γ o.customer\_id (ρo(orders)) ⋈o.order\_id=x.order\_id(ρx(πod.order\_id,ρtotal(sum(b.price\*od.quantity)) (σod.book\_id=b.book\_id γ od.order\_id ((ρb(book) x ρod(orderdetails)))))) )) )
8. πρquarter(QUARTER(o.order\_date)),ρtotal(SUM(x.total))(σo.order\_id=x.order\_id) γ quarter(ρo(orders))⋈(ρx(πod.order\_id,ρtotal(SUM(b.price\*od.quantity)) (σ(b.book\_id=od.book\_id) γ od.order\_id (ρb(book) X ρod(orderDetails))))))
9. πρjoin\_customers(COUNT(c.customer\_id))(σc.join\_date>’2018-05-20’ (ρc(customers)))
10. πρtotal,p.supplier\_id(SUM(p.quantity\*sb.price))(σ(p.supplier\_id=sb.supplier\_id) ∧ (sb.book\_id=p.book\_id) ∧( p.supplier\_id=3) (ρp(purchase) X ρsb(supplier\_books)))
11. πρtotal(SUM(x.total))(σo.employee\_id=3 ∧ o.order\_date>= ‘2018-04-01’ γ o.employee\_id ρo(orders)⋈o.order\_id=x.order\_id(ρx(πod.order\_id,ρtotal(SUM(b.price\*od.quantity))(σod.book\_id=b.book\_id γ od.order\_id(ρb(book) X ρod(orderDetails))))))
12. πb.title,sum\_quantity(σx.book\_id=b.book\_id τ x.sum\_quantity DESC(ρb(book))⋈(ρx(πod.book\_id,ρsum\_quantity(SUM(od.quantity))(σ(o.order\_id=od.order\_id) ∧ (o.order\_date BETWEEN ‘2018-10-10’ ∧ ‘2018-12-02’) γ od.book\_id limit 10(ρo(orders) X ρod(orderDetails))))))

**מקרא:**

π select

σ where

⋈ join

γ group by

τ order by

ρ rename (as)

g Aggregate Operation (sum,count)