6.

(a)

(c)(i) **Ans:**

Consider the non-homogeneous equation system=, whereand *A* an arbitrary 3-vector in *R*3.

. Hence, rank of K *is* , *r* = 3.

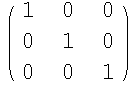
The rank of [*K* | *A*] is also 3 irrespective of what the component of *A* are. So the system *KX* = *A* is consistent. Hence, it is always possible to express any 3-vector *A* in *R*3 as linear combination in in the form

,

with the solution of guaranteed to exist. This prove *S*= {*K*1, *K*2, *K*3} spans *R*3.

c(ii)

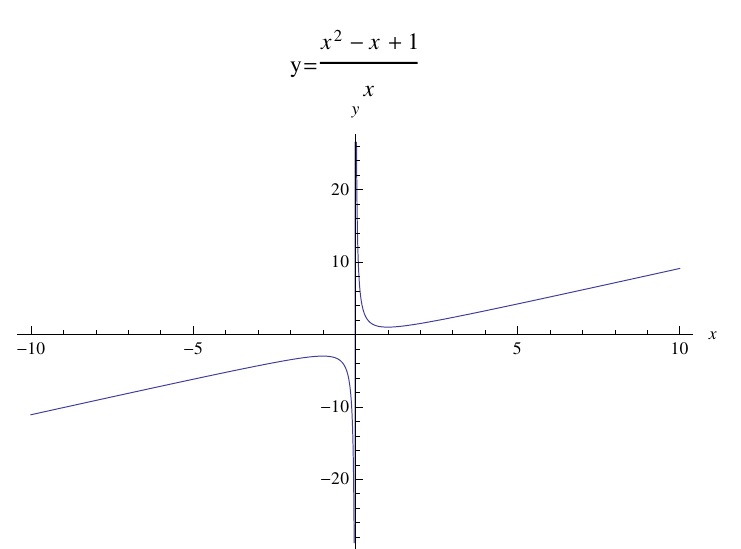
Consider the homogeneous problem, where *K*=, a 3 by 3 matrix, and *X*=T.

*K*=~, hence rank [*K*] = 3; so is the number of unknown, *n* = 3. The HE system also has the same number of unknowns. Since *r* = *n,* the HE system admits only trivial solution, *X*=T.

By definition, this proves the linearly independence of the vector set {}, as is true only for *X*=T*.*

Q2

1. (i) Sketch the graph (page 320, PE 46). You must label your sketch appropriately.



25 marks full for labeling the asymptots.

Use l’Hopital rule to find the limits (page 320, PE 53, 60).

(ii)

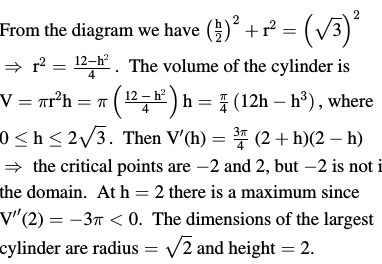
Solution = 0. Just simple substitution.

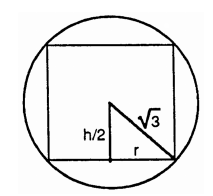
(iii)

. Solution = +infinity.

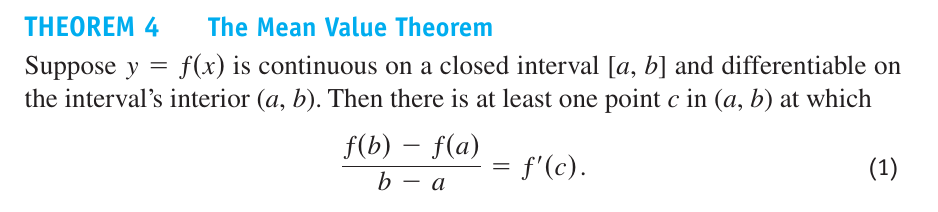
1. Find the height and radius of the largest right circular cylinder that can be put in a sphere of radius

Sol: Pg 321, PE 67





(ii) State the Mean Value Theorem. [*Nyatakan teorem Nilai Min.*]



(iii) Use the Mean Value Theorem to proof the following statement: If *f* ’(*x*)=0 at each point *x* of an open interval (*a*,*b*), then *f*(*x*)=*C* for all , where *C* is a constant.

