Assignment 8

Wednesday, March 8, 2017 9:41 PM

Q 7.6

Ans 7.6 ⇒ Since, $D = GZ$ and G is an Identity matrix. Hence, $D = Z$.

Since, $Z \in \mathbb{Z}^{n \times p}$ has to form a pspanning set and the smallest set that could pspan $\mathbb{R}^n$ is the positive basis with $n+1$ elements, hence $p \geq n$.

Q 7.10

Ans 7.10 ⇒ The first eight iterates from Example 7.14 are;-

	x_1	x_2	$f(x_1, x_2)$
1.	0.5	0.5	0.5625
2.	1	0.5	0.5
3.	0	0.5	0.25
4.	0	0.5	0.25
⋮	⋮	⋮	⋮
8.	0.25	0.25	0.1602

Hence, the first 8 iterates are same as Example 7.14.

Q (b)

Ans (b) - The minimum value of function is -0.0185 at $x = [0.8333, 0]^T$.

Q7.12 → Please see the matlab code.

end.

Ans 7.12 → $f(a,b) = b^2((a-1)^2+2) - 2(\max\{b-a,0\})^2 + 8(\min\{a,0\})^2 + (a-1)(\max\{a-1/2,0\})^2$

Now, for $a = 2^{-i}$, $a \geq b > 0$ and $\delta = a$,

$$f(a,b) = b^2((a-1)^2+2) - 2(\max\{b-a,0\})^2 + 8(\min\{a,0\})^2 + (a-1)(\max\{a-1/2,0\})^2$$

$$= b^2((a-1)^2+2) - 0 + 0 + 0$$

$$= b^2((a-1)^2+2)$$

and, for direction d_1, we have

$$f((a,b) + \delta(1,0)) = f((a,b)+(a,0)) = f(2a,b),$$

hence,

$$f(2a,b) = b^2((2a-1)^2+2) - 0 + 0 + (2a-1)(\max(2a-1/2,0))^2$$

for $a \leq \frac{1}{4}$,

$$= b^2((2a-1)^2+2)$$

Now, $f(a,b) - f(2a,b) = b^2((a-1)^2+2) - b^2((2a-1)^2+2)$

$$= b^2(a^2-2a+1-4a^2+4a-1)$$

$$= b^2(2a-3a^2)$$

$$= b^2 a(2-3a)$$

for $a \leq \frac{1}{4}$,

> 0.

hence, $f(2a,b) < f(a,b)$

... till $a = 1$

hence, $f(2a,b) < f(a,b)$

Now, as $a = 2^{-i}$, this will continue till $a = 1$.