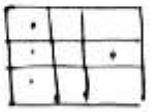
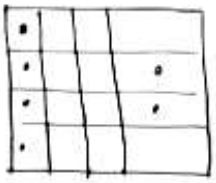
1. Bishop must be at maximum seperation and thereby must aside on extreme column/rows.

n=odd 

on a side if there is n bishops
on the other side there must be (n-2) bishops
hence a total of (2n-2) bishops

n=even 

on a side if there is n bishops
on the other side there must be (n-2) bishops
hence a total of (2n-2) bishops

2. P(x) is a non constant polynominal which must be of form

$P(x) = ax^n + bx^{n-1} + \ldots + cx$, hence no terms with x^0

hence, $P(x) = x(ax^{n-1} + bx^{n-2} + \ldots + c)$ = composite QED

3. It satisfies $x = 1, 2, 3, \ldots, n$

4 $f(1) = 0$

$f(0) = 0$

$f'(c_1) = 0 \quad c \in (0,1)$

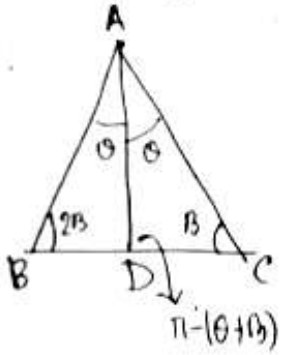
$f'(0) = 0 \quad f'(c_1) = 0 \quad f''(c_2) = 0 \quad c_2 \in (0, c_1)$

$f''(0) = 0 \quad f''(c_2) = 0 \quad f'''(c_3) = 0 \quad c_3 \in (0, c_2)$

$\therefore f^n(0) = 0 \quad f^n(c_n) = 0 \quad f^{n+1}(c_{n+1}) = 0 \quad c_{n+1} \in (0, c_n)$

5' $2|m$ or $2|n$ and m,n must positive

6. $t = \frac{\sqrt{1+x^2}}{2} + \frac{1-x}{3}$ which minimizes to $t = \frac{2+\sqrt{5}}{6}$ hours

7. 

$\theta + \theta + 2\beta + \beta = \pi$

$\therefore 2\beta = \pi$

$AD/\sin\beta = DC/\sin(\pi-(\theta+\beta)) = DC/\sin\theta$

$AD = \frac{DC\sin\beta}{\sin\theta}$

$\frac{\sin 2\beta}{\sin(\theta+\beta)} = \frac{\sin\beta}{\sin\theta}$

$\Rightarrow 2\sin\theta\sin\beta = \sin(\theta+\beta)$

$\Rightarrow \sin(\theta+\beta) + \sin(\theta-\beta) = \sin(\theta+\beta)$

$\Rightarrow \sin(\theta-\beta) = 0$

$\Rightarrow \theta = \beta$

8. We know, $g(K,n)=1$.

Let, $\gcd(n-K, n)=a$ (let)

so, $a|(n-K)$ $a|n$ —— (I)

hence, $a|n-(n-K) \Rightarrow a|K$ —— (II)

(I) and (II) we get,

$a|(n,K)$ $\gcd(n,K)=a$

which leds to contradiction

hence $\gcd(n-K,a)=1$