Solution

Q1: $H = 2(8)5(50) = 4000$ hr/yr, $\quad t_h = 6\left(\frac{H}{12}\right) = 2000$ hr, $\quad h = \frac{x_h}{t_h} = \frac{0.2}{2000} = 0.0001$

Q2

	A	B	C
1	Unit Sales Price	(p, \$/q)	70
2	Unit Operating Cost	(c, \$/q)	50
3	Unit Capital Cost	(k, \$/q)	1
4	Discount Factor	(g)	0.2
5	Inventory Carrying Rate	(h)	0.01
6	Demand Rate	(r_d, q/hr)	10
7	Effective Production Rate	(r_e, q/hr)	15
8	Maximum FGI	(q^{max}_{FG})	20
9	Probability Out of FGI	(π_0)	=(1 -C7/C6)/(1 - (C7/C6)^(C8+1))
10	Cycle Time	(t_{CT})	=(C6/(C7 - C6))*(1/C7) + (1/C7)
11	Average FGI Level	(q_{FG})	=avgFGI(C6,C7,C8)
12	Total Profit	(TP, \$)	=(C1 - C2)*(1 - C9 + C9*(1 - C4*C10))*C6 - (C2+C3)*C5*C11 - C3*C7
13	Upper Bound on TP	(TP_{UB}, \$)	=(C1 - C2 - C3)*C6
14	Utilization	(u)	=C6/C7

```
Public Function avgFGI(rd As Double, re As Double, qmaxFGI As Integer) As Double

Dim pi0 As Double
Dim i As Integer

pi0 = (1 - re / rd) / (1 - (re / rd) ^ (qmaxFGI + 1))
avgFGI = 0
For i = 1 To qmaxFGI
    avgFGI = avgFGI + i * (re / rd) ^ i
Next i
avgFGI = pi0 * avgFGI

End Function
```

Q3

Annual Demand	(q/yr)	15,000
Sale Price	(p, \$/q)	50
Cost Cap Recovery	(K, \$/yr)	100,000
Annual Operating Hours	(H, hr/yr)	2,000
Known Capacity	(r_e, q/hr)	9.00
Capital Cost per Unit	(k, \$/q)	5.56
Operating Cost	(OC, \$/yr)	500,000
Oper Cost per Unit	(c, \$/q)	33
Unit Sales Price	(p, \$/q)	50
Unit Operating Cost	(c, \$/q)	33
Unit Capital Cost	(k, \$/q)	5.56

Delay Time	(t_g, hr)	0.33	
Percent Price Reduction	(x_g)	0.2	
Discount Factor	(g)	1.80	
Obsolescence time	(t_h, hr)	4	
Percent Value Reduction	(x_h)	0.8	
Inventory Carrying Rate	(h)	0.2	
Annual Demand	(q/yr)	15,000	
Demand Rate	(r_d, q/hr)	7.50	
Effective Production Rate	(r_e, q/hr)	15.00	
Maximum FGI	(q^{max}_{FG})	2	
Probability Out of FGI	(π_0)	0.142857	
Cycle Time	(t_{CT})	0.133333	
Average FGI Level	(q_{FG})	1.428571	
Total Profit	(TP, \$)	26.27	(a)
Upper Bound on TP	(TP_{UB}, \$)	83.33333	(b)