1 Potato Leafhopper.

By running the OpenBUGS code (attached in Appendix A, we obtain the results shown in Figure

	mean	sd	MC_error	val5.0pc	val95.0pc	start	sample
beta0	100.1	23.6	0.8037	60.58	137.6	1001	100000
beta1	-1.004	0.3029	0.01032	-1.484	-0.4969	1001	100000
develop[6]	24.43	9.662	0.03849	8.818	39.95	1001	100000
develop[12]	8.217	10.5	0.1386	-8.427	25.45	1001	100000
temp[4]	73.8	8.242	0.03652	59.82	87.97	1001	100000

Figure 1: OpenBUGS result for problem 1

(a) The estimated parameter β_0 and β_1 are 100.1 and -1.004, respectively. The fitted linear regression model is

$$y = 100.1 - 1.004x.$$

(b) Based on the results, the missing value in temperature is 73.8 with 90% credible set as $[59.82, 87.97]$. The first and the second missing values in develop is 24.43 and 8.217, respectively. Their 90% credible sets are $[8.818, 39.95]$ and $[-8.427, 25.45]$, respectively.

2 Dukes' C Colorectal Cancer and Diet Treatment.

We run the OpenBUGS code (attached in Appendix B) and obtain the results shown in Figure 2.

	mean	sd	MC_error	val2.5pc	median	val97.5pc	start	sample
beta0	-4.993	0.8113	0.03783	-6.69	-4.966	-3.467	1001	100000
beta1	-0.2312	0.4369	0.008206	-1.105	-0.2306	0.6201	1001	100000

Figure 2: OpenBUGS result for problem 2

Based on the results, we see that the estimated values of the coefficients are -4.993 and -0.2312 for β_0 and β_1, respectively. As the 95% credible set of coefficient β_1 contains zero, it is not obvious that the linoleic acid treatment is beneficial.

A OpenBUGS Code for Problem 1

```
    model {

for (i in 1:n) {

develop[i] ~ dnorm(mu[i], tau)
mu[i] <- beta0 + beta1*temp[i]
temp[i] ~ dunif(55, 95)

}

beta0 ~ dnorm(0, 0.0001)
beta1 ~ dnorm(0, 0.0001)
tau ~ dgamma(0.0001, 0.0001)
sigma2 <- 1/tau

}

# DATA
list(n=13)

temp[] develop[]
59.8 58.1
67.6 27.3
70.0 26.8
NA 26.3
74.0 19.1
75.3 NA
78.0 16.5
80.4 15.9
81.4 14.8
83.2 14.2
88.4 14.4
91.4 NA
92.5 15.3
END

# INIT
list(beta0 = 0, beta1 = 0, tau = 1)
```

B OpenBUGS Code for Problem 2

```
model {
for (i in 1:n) {
time[i] ~ dweib(v, lambda[i])I(censored[i], )
lambda[i] <- exp(beta0+beta1*treatment[i])
}

beta0 ~ dnorm(0, 0.0001)
beta1 ~ dnorm(0, 0.0001)
v ~ dexp(0.001)
}


# DATA
list(n=49)

treatment[] time[] censored[]
1 NA 1
1 NA 5
1 6 0
1 6 0
1 NA 9
1 10 0
1 10 0
1 NA 10
1 12 0
1 12 0
1 12 0
1 12 0
1 NA 12
1 NA 13
1 NA 15
1 NA 16
1 NA 20
1 24 0
1 NA 24
1 NA 27
1 32 0
1 NA 34
1 NA 36
1 NA 36
```

```
1 NA 44
0 NA 3
0 6 0
0 6 0
0 6 0
0 6 0
0 8 0
0 8 0
0 12 0
0 12 0
0 NA 12
0 NA 15
0 NA 16
0 NA 18
0 NA 18
0 20 0
0 NA 22
0 24 0
0 NA 28
0 NA 28
0 NA 28
0 30 0
0 NA 30
0 NA 33
0 42 0
END

# INIT
list(v=1, beta0=0, beta1=0)
```