**STAT 604 Exam 2** **Fall, 1999 Dr. Newton**

**Name:** _____

1. (20 pts) What is the result of the first splitting of the vector

```
 18  7 16 10  4 15 13  9  5 20 11 14 19  6  3  2  1 17 12  8
```

Give both the new vector and the variables `ns`, `ll`, and `lr`.

2. (20 pts) How would you use Newton-Raphson to find a relative minimum of the function

$$S(\theta) = \sum_{i=1}^{n} (y_i - \theta_1 X_{i1} - e^{\theta_2 X_{i2}})^2,$$

where $\theta^T = (\theta_1, \theta_2)$ and we observe $(y_i, X_{i1}, X_{i2})$ for $i = 1, \ldots, n$. Assume you have a reasonable starting value for the process.

3. (20 pts) How would you TEX the displayed equation in the previous question?

4. (20 pts) What are displayed by the following Splus commands?

   a. `matrix(1:12,6,2)`

   b. `solve(matrix(c(4,2,2,4),2,2))`

   c. `max(dnorm(seq(-3,3,length=101)))`

   d.
```
x <- 1:20
sum(x[x<=10])
```

   e. `pnorm(qnorm(.75))`

5. (20 pts) Consider a random sample of size $n$ from an exponential distribution having pdf

$$f(x;\lambda) = \lambda e^{-\lambda x}, \qquad x > 0.$$

   a. Express the median $M$ of $X$ as a function $g(\lambda)$ of the parameter $\lambda$.

   b. Find the derivative of $g$ with respect to $\lambda$.

   c. Find $-n\mathrm{E}(\partial^2 \log f(x)/\partial\lambda^2)$.

   d. Thus find ase$(\tilde{M})$ where $\tilde{M}$ is the MLE of $M$.