STAT 604 Exam 1 **Fall, 1996 Dr. Newton**

1. (12 points) Why does the following program print

```
192  104  188  0  0  0  0  0
```

```
      double precision c

      c=-197.875
      call prtcon(c)

      stop
      end

      subroutine prtcon(c)

      character*1 c(8)

c   ichar(h) is the ascii code of the character h:

      write(*,*) (ichar(c(i)),i=1,8)

      return
      end
```

2. (12 points) Show that a kernel density estimate that uses a pdf for the kernel is in fact a pdf.

3. (12 points) If I have a (5×5) matrix X in a main program whose (i, j)th element is defined to be $10 * i + j$ and I use $n = 3$ in a call to a subroutine that calculates the sum of the diagonal elements of a matrix which is dimensioned in the subroutine to be $(n \times n)$, what would I get? What is the sum of the first three diagonal elements of X in the main program?

4. (12 points) Show that sweeping a (2×2) matrix A on both of its diagonals gives A^{-1}.

5. (12 points) Find an expression for the quantile function of the minimum of n iid random variables in terms of that of one of the random variables.

6. (12 points) Write a double precision Fortran function called `trace` which returns the trace of an $(n \times n)$ double precision matrix A, that is, the sum of its diagonal elements.

7. (12 points) A megaflop is the number of millions of floating point operations (multiplications and additions, typically) per second a computer can do. If I have a 2 megaflop computer, approximately how long would it take to run a program that requires multiplying two (100×100) matrices 10,000 times?

8. (12 points) If we use Newton's root finding method to approximate the cube root of 8 and we use the value 1 as the starting value, what would we get for the first two iterations?

9. (4 points) If I use a multiplicative congruential uniform random number generator with multiplier 7, modulus 15, and seed 12, what is the first value generated?