A Monte Carlo Method
Solutions

Write a Matlab function *MCmeasure* to these specifications:

Input: f the name of a real-valued function defined on $[a,b]$,
            t a real threshold value,
            a a real value to be the lower limit of an interval,
            b a real value to be the upper limit of an interval, and
            n the number of random values to use.

Output: *measure*   the measure of the interval $[a,b]$ of those values of x such
                    that $f(x) \geq t$.

Scalar Solution:

```
function  measure = MCmeasure (f, t, a, b, n)
%Input:       f        the name of a function,
%             t        a real threshold value,
%             a        a real value to be the lower limit of an interval,
%             b        a real value to be the upper limit of an interval, and
%             n         number of random values to use.
%
%Output:    measure        the measure of the interval [a, b] of those values of x
%                          such that f(x) >= t.
fun = fcnchk (f);
x = a + (b-a)*rand (n,1);
sum = 0;
for i = 1:n
    sum = sum + (feval(fun, x(i)) >= t);
end
measure = (b-a)*sum/n;
```

Vector Solution:

```
function  measure = MCmeasure (f, t, a, b, n)
%Input:       f        the name of a function,
%             t        a real threshold value,
%             a        a real value to be the lower limit of an interval,
%             b        a real value to be the upper limit of an interval, and
%             n         number of random values to use.
%
%Output:    measure        the measure of the interval [a, b] of those values of x
%                          such that f(x) >= t.
measure = (b-a)*sum(feval(fcnchk (f,'vectorized'), a + (b-a)*rand (n,1)) >= t)/n;
```