

AMSC/CMSC 460 Quiz 3 , Fall 2001

Show all work. You may leave arithmetic expressions in any form that a calculator could evaluate. By putting your name on this paper, you agree to abide by the university's code of academic integrity in completing the quiz. Use no books, calculators, cellphones, communication with others, scratchpaper, etc.

Name _____

Student number _____

1. (10) Let

$$s(x) = \begin{cases} (x-2)^3 + 2(x-2) + 1 & \text{if } x \leq 2 \\ -x^3 + 6x^2 - 10x + 5 & \text{if } x > 2 \end{cases}$$

Is s a cubic spline? Justify your answer.

2. (10) (P3.1.1) Modify the `Locate` function so that it tries $i = g + 1$ and $i = g - 1$ before resorting to binary search. (Take care to guard against subscript out-of-range.)

```
function i = Locate(x,z,g)
% i = Locate(x,z,g)
% Locates z in a partition x.
%
% x is column n-vector with x(1) < x(2) <...<x(n) and
% z is a scalar with x(1) <= z <= x(n).
% g is an optional 3rd argument that satisfies 1 <= g <= n-1.
%
% i is an integer such that x(i) <= z <= x(i+1).
% Before the general search for i begins, the value i=g is tried.

if nargin==3
% Try the initial guess.
    if (x(g)<=z) & (z<=x(g+1))
        i = g;
        return
    end
end
n = length(x);
if z==x(n)
    i = n-1;
else % Binary Search
    Left = 1;
    Right = n;
    while Right > Left+1 % x(Left) <= z <= x(Right)
        mid = floor((Left+Right)/2);
        if z < x(mid)
            Right = mid;
        else
            Left = mid;
        end
    end
    i = Left;
end
```