CS3451. Fall 08. Solution to Q01 Grade: out of 10

Each question is worth 2 points. Write legibly. In your solutions, use points and vectors and the functions and operators discussed in the reading material and in class, such as n(), U(), V(), R(), +,–,• … or their mathematical equivalents.

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1) Provide a "valid" expression for the point P at one third from A towards B?

A+AB/3

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2) Explain the terms "normal" and "norm" and give an example of their use in proper context?

The normal to a line is a direction orthogonal to it. A vector is normal to a line if it is orthogonal to it.

The norm of a vector is its length.

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3) Let <1,2 > and <4,3> be two vectors. What is their dot-product?

4+6 = 10

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4) Provide the pseudo-code or geometric construction for testing whether the polygonal path {A,B,C} makes a right turn at B.

dot(R(V(A,B)),V(A,C))>0. Also acceptable R(AB)•AC>0 or R(AB)•BC>0…

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5) You are given two frames $[O_1,I_1,J_1]$ and $[O_2,I_2,J_2]$ and the local coordinates (x_1,y_1) of a point P in $[O_1,I_1,J_1]$. Provide the construction or expression for the local coordinates (x_2,y_2) of P in $[O_2,I_2,J_2]$.

P= O1+ x1I1+ y1J; x2= O2P•I2; y2= O2P•J2;

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6) Write a simple algorithm for computing the sum of the two largest values in an array A of n integers. Your algorithm does not need to be efficient. You may not use a call to sort the array. (For extra credit, if needed.)

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float s=A[0]+A[1]; for (int i=0; i<n-1; i++) for (int j=i+1; j<n; j++) s=max(s,A[i]+A[j]);
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