

BE1010 – Fall 2004

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Quiz # 3 (15 minutes. ***CLOSED BOOK***)

Solve one problem only

- I. Assume that Tankbot has a Lego light sensor (pointing forward) attached to sensor input # 2. Write an NQC program which controls Tankbot so that it tracks an object (say your hand) placed directly in front of it. As the object moves, Tankbot is supposed to move so that it maintains a distance of about 1 inch from the object at all times. Assume that the object moves slowly and is always facing the light sensor.

*** This is just one of many variations that would accomplish this task***

```
#define THRESHOLD 40

task main()
{
  SetSensor (SENSOR_2, SENSOR_LIGHT);
  OnFwd (OUT_A+OUT_C);
  while (true)
  {
    if (SENSOR_2 >= THRESHOLD)
    {
      OnRev (OUT_A+OUT_C);
    }
    else if (SENSOR_2 < THRESHOLD)
    {
      OnFwd (OUT_A+OUT_C);
    }
  }
}
```

- II. Design the smallest diagonal bracing structure (i.e., smallest area triangular shape bracing) using Lego beams and plates. Specify the dimensions of the resulting triangular structure (base, height, and hypotenuse) in Lego units.

$$[(5 \text{ units})^2 + (14 \text{ units})^2]^{1/2} = 14.9 \text{ (a "very good" fit)}$$

(Note: a *perfect* fit requires a hypotenuse = 15)

Therefore, a 5x14x15 Lego units is the smallest possible triangle

