

### Problem Set 7: Extra Problems

1. You are standing at the point  $(-100, -100, 430)$  on a hill that has the shape of the graph of

$$z = 500 - (0.003)x^2 - (0.004)y^2.$$

(All units are in feet.) What will be your rate of climb if you head northwest at a speed of 2 feet per second? At what angle from the horizontal will you be climbing?

2. Heron's formula gives the area of a triangle with sides of lengths  $a, b, c$  as

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

where  $s = \frac{1}{2}(a + b + c)$  is the semiperimeter. Show that the triangle of largest area for any fixed perimeter is equilateral. (Hint: It is equivalent to maximize  $A$  or  $A^2$ .)