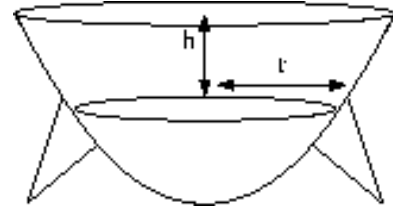


Name: \_\_\_\_\_

**Quiz 4**  
**Math 120U**

1. Andy the Zombie King wants to fill up a demonic cauldron with blood for an unholy ritual. The cauldron is round with a parabolic cross section as shown in the picture. The cauldron is 3 feet tall and 4 feet wide.



a) Impose a coordinate system and find an equation for the parabolic cross section of the cauldron.

b) As the cauldron is filling with blood, the surface of the blood makes a circle. If  $r$  is the radius of the circle, find a function  $h = f(r)$ , where  $h$  is the distance from the surface of the pool to the top of the cauldron. (Hint: Make sure to check your answer.)

c) What is the domain of the function you found in part (b)? What is the range? (Note that you can't have a circle with a negative radius.)

d) Is  $f(r)$  one to one on this domain?                      YES    NO

e) Does  $f(r)$  have an inverse on this domain?                      YES    NO

(More on the back)

e) If  $f(r)$  has an inverse,  $r = f^{-1}(h)$ , find it. If it doesn't have an inverse, find two functions which are inverses for  $f$  if we restrict the domain.

f) Check your answer from part (e) by finding  $f(f^{-1}(h))$ .

2. Andy the Zombie King must prepare his sacrifices for the unholy ritual. He scrambles their brains with math problems. As his victim, you must find the inverses for the following functions if they exist. If an inverse doesn't exist, say so.

a)  $y = x^3 + 3$

b)  $y = \frac{x-3}{2x-3}$