

Your name:

Instructor (please circle):

Barnett

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Math 11 Fall 2010: written part of HW5 (due Wed Oct 27)

Please show your work. No credit is given for answers without justification.

1. [8 points] You are designing a cuboid-shaped aquarium with volume 3 cubic feet. The base is made of slate and the sides are made of glass (the aquarium has no top). If slate costs \$6 per square foot and glass only \$1 per square foot, what is the total material cost of the cheapest aquarium you can make, and what dimensions achieve this?

[Unusual design, eh? I wonder why it's not used for real aquaria...]

2. [10 points]

(a) Compute $\iint_R x(1+xy)^4 dA$ over the rectangle $R = [0, 2] \times [0, 1]$. [Hint: don't expand out the 4th power!]

(b) By interpreting the integral as the volume of a solid body, evaluate $\iint_D \sqrt{4-x^2-y^2} dA$ where the domain is $D = \{(x, y) : y \geq 0, x^2 + y^2 \leq 4\}$ [Hint: do not try to evaluate this as an iterated integral. Rather, relate it to a well-known solid body]

3. [10 points] Compute the integral of the function $f(x, y) = 2x + y$ over the region bounded by the line $y = x - 2$ and curve $x = y^2$