**Math 201 Extra Problems for Part III** *N. Nahlus*

**Final Exam.**  Parts I, II: 22% on chapter 10, 22% on chapter 14

 Part III: 38% on chapter 15, 18% on chapter 16.

**1**. Find the value of  (Change the order of integration) (Fubini’s Thm.)

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**2**. **Evaluate**   (Hint: Change to **polar**. )

**3**. Find the area of the region that is inside the lemniscate & inside the circle .

Hint: 

**4a.** Set up (but do not evaluate) the triple integral(s) in  **Cylinderical**  coordinates that represent the volume of the region in the 1st octant bounded by the cylinder  and the surface 

**4b.** Set up (but do not evaluate) the triple integral(s) in  **Cartesian** coordinates that represent the volume of the region in the first octant bounded by the **coordinate planes** below the surface 

**5. a)** Set up (but do not evaluate**)** the triple integral(s) in **spherical** coordinates in the order *dρ dϕ dθ*

 that represent the volume of the region inside the sphere  and inside 

**b)** Set up (but do not evaluate) the triple integral(s) for the above volume in the order *dϕ dρ dθ.*

*Note:* This is problem 31 in section 15.7 whose answer appears at the end of Thomas book.

Note: *All curves C below are assumed to be* *smooth (except for finitely many pints)*

 ***counter clockwise, and traced once.***

**6a.** Use **Green’s Theorem** to find the circulation and the (outward) Flux 

 and C is the circle: 

**6b.** Evaluate for any path C (not passing through the origin) from A(1,1) to B(3,2) by finding a potential function f(x,y) **by inspection.**

**6c.** How would you solve 14b without finding a potential function f(x,y)?

(For simplicity, assume C is in the simply connected region R= The plane minus the negative x-axis).

(Hint ++: Use the 3 theorems in 16.3 to replace C by a straight line from A to B.)

**7a**. Use **Green’s Theorem** (in a clever way) to find 

where C is the circle . (Hint ++: Use the half-substitution trick).

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**7b.** Use **Green’s theorem** (with holes) to show that  for any simple closed curve C around the origin. **7c:** In 7b, what happens if C is not surrounding the origin.

Hint: Check  except at the origin.

**7d)** What are the ----- 3 secrets----- in proving Green’s Theorem (Circulation version)

**8) (15.8)**  Thomas Problems in **15.8**: 22, 23, 9

**9)**  **16.4:** Lecture Problem**s**  Level \*\*\*\* (like Green’s Theorem for non-closed curves, …etc)

**10)** **16.4**: Thomas : 17 (Flux), 27(Area) (just set up integrals)

 Thomas: 37 (very easy), 39 (where F=grad(f) where f=…...) Hint: For 39a, see 37.

**11)** More problems on 15.2 and 15.4 (like problems 1, 2, 3 above & others)

 (Start with Lecture problems -----then check Thomas book)

**12)** More problems on 15.5, 15.7 (Start with Lecture problems----- then check Thomas book)

**13)** **15.6**: Formulas for: center of mass & Iz (the 2nd moment of inertia around z-axis)

***Good Luck***