**Math 201** **Final Exam.** (Jan 200A) (Time: 140 minutes) N. Nahlus & H. Yamani

**Name**  ................................... ……….. **I.D**  ...................

***Section number: Circle your Recitation section***

(section 13: 11:00 Th) (section 14: 3:30 Th) (section 15: 2:00 Th) (section 16: 12:30 Th)

**1)** (5 %) Investigate the series  for Abs. /cond. Convergence or Divergence

|  |  |
| --- | --- |
|  Problem 1 |  Problem 6 |
|  Problem 2 |  Problem 7 |
|  Problem 3 |  Problem 8 |
|  Problem 4 |  Problem 9 |
|  Problem 5 |  Problem 10 |
|  **Total** |  Total |

|  |
| --- |
|  Problem 11  |
|  Problem 12 a, b |
|  Problem 13 |  Total 1 |
|  Problem 14 a,b |  Total 2 |
|  Problem 15 a,b |  Total 3 |
|  Bonus |  TOTAL |
|  **Total**  |

**2)** (4 %) Investigate the series  for convergence or divergence.

**3)** (12 %) **INSERT** True-False. **WITH Penality**: ** for each wrong answer** .

Note: The extra spaces below are for your convenience

a)  is Convergent: ………………… (INSERT TRUE/FALSE)

b) a)  is Convergent: ………………… (INSERT TRUE/FALSE)

c)  (for all n) implies  is Divergent: ………… (INSERT TRUE/FALSE)

d)  is Divergent: ………… (INSERT TRUE/FALSE)

1. (6%) Find the domain of convergence of 

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**5.** (5 %) **(i) Find** 

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 **(ii)** Deduce the value of .

Hint: From tabular integration, 

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**6.** (6%) Find the points on the surface  where the tangent plane is **parallel**

to the xy-plane. (Hint: Two planes are parallel if their normal vectors are parallel)

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**7**. (6 %) The function  at a point p increases most rapidly in the direction of

 the vector v=(3,4,5) with directional derivative .

(i) Find 

(ii) Find the directional derivative of  at p in the direction of the vector w=(4, 0, 3)

**8**. (7 %) Investigate the critical points of



for local maxima, local minima, saddle points.

**9**. (7 %) Find the value of  (Hint: Reverse the order of integration)

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**10**. (4 %) **Evaluate**   (Hint: Change to **polar**. Then use substitution)

**11**. (6 %)Set up (**but do not evaluate)** the double integral(s) in **polar** coordinates that represent the area of the region that is inside the lemniscate & inside the circle .

Hint: 

**12a.** (4 %) Set up (**but do not evaluate)** the triple integral(s) in  **Cylinderical**  coordinates

that represent the volume of the region bounded by the cylinders  and 

**12b.** (5 %) 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  (Hint: The surface  hits z=0 at ………….)

**13.** (6 %) Set up (**but do not evaluate)** the triple integral(s) in **spherical** coordinates that represent the volume of the region inside the sphere  , inside the

cylinder , and above the xy-plane.

Note: *All curves below are assumed to be* *(smooth, counter clockwise & traced once)*

**14a.** (5 %) Use **Green’s Theorem** to find 

where C is the circle: 

**14b.** (4 %) Find  where C is a *complicated* curve (not passing through the origin) from A(1,1) to B(3,2).

(**Hint**: By inspection, By inspection, find your potential function f(x,y))

**15a**. (3 %) Use **Green’s Theorem** (in a clever way) to find  where C is the circle 

.

**15b.** (5 %) Use Green’s theorem (with holes) to find 

where C is any complicated simple closed curve around the origin.

Hint: Assume without proof that  except at the origin

**Bonus 4 %**  Use Gauss Theorem (or the divergence Theorem)

to find the outward **flux**  of the vector field

1.  across the sphere 
2.  across the sphere 

Reminder: JUST use Gauss Theorem. (Do not, Do not, calculate )