

Concordia University

Math 265

Sample Class Test

Feb 2016

Instructor: C Cummins

Time: 60 mins

40 marks (30% of final grade)

All solutions must include a reasoned explanation.

Q1 (10 marks)

- a) Sketch the region of integration and change the order of integration:

$$\int_{y=-2}^{y=2} \int_{x=0}^{x=\sqrt{4-y^2}} f(x, y) \, dx \, dy$$

- b) Evaluate the integral of part a when $f(x, y) = y^3$

Q2 (10 marks)

- a) Use polar coordinates to find the volume of the solid bounded by the paraboloids $z = 6 - x^2 - y^2$ and $z = 2x^2 + 2y^2$.
- b) Evaluate the integral by converting to polar coordinates:

$$\int_{y=0}^{y=1/2} \int_{x=\sqrt{3}y}^{x=\sqrt{1-y^2}} xy^2 \, dx \, dy$$

Q3 (10 marks)

Find the moment of inertial I_x for the lamina that occupies the region D which is the triangular region enclosed by the lines $y = 0$, $y = 2x$ and $x + 2y = 1$ with mass density $\rho(x, y) = x$.

Q4 (10 marks) Evaluate the triple integral

$$\int \int \int_E y^2 z^2 \, dV,$$

where E lies above the cone $\phi = \pi/3$ and below the sphere $\rho = 1$.