MATH 2415 Calculus III SI Session 10/26/2011

SI: Neil Jody Professor: George Stockton

Wednesdays Rm 1245 03:00 PM - 05:00 PM and 05:00 PM - 07:00 PM

1. Evaluate the iterated integrals.
   (a) $\int_0^1 \int_0^\pi e^x \sin(y) dy dx$ (b) $\int_0^{\pi/2} \int_1^e \frac{\sin(y)}{x} dx dy$

2. Express $\int_1^4 \int_1^{\sqrt{x}} x\, e^y\, dy dx$ as an iterated integral with the reverse order of integration.

3. Reverse the order of integration for $\int_0^{\ln 2} \int_{e^y}^2 f(x,y) dx dy$.

4. Set up a double integral and evaluate.
   (a) $\int\int_D (4-x^2) dA$; D : region bounded by $y=0$,$x=0$ and $y=4-x^2$.
   (b) $\int\int_D \frac{y}{1+x^2} dA$; D : region bounded by $y=0$, $y=\sqrt{x}$ and $x=4$.
   (c) $\int_0^1 \int_{y/2}^{1/2} e^{-x^2}\, dx dy$ (d) $\int_0^{\ln 10} \int_{e^x}^{10} \frac{1}{\ln y} dy dx$

5. Let D be the region bounded by the graphs of $x=y^2$ and $x-y=2$. Evaluate the integral $\int\int_D (6x + 12y^2) dx dy$.

6. Let D be the triangular region with vertices (-1,0),(0,2) and (2,0). Using the change of variables $x=\frac{u+v}{3}$,$y=\frac{2v-u}{3}$, express $\int\int_D (x+y) dx dy$ as an iterated integral. Do Not evaluate the integral.

7. Let D be the region in the first quadrant of the $xy-$plane bounded by the graphs of $(x-1)^2+y^2=1$,$x=1$ and $y=0$. Express $\int\int_D e^{x^2+y^2}\, dA$ as an iterated integral in polar coordinates.

8. Convert $\int_0^{\sqrt{3}} \int_1^{\sqrt{4-x^2}} \sqrt{x^2+y^2} dy dx$ to an iterated integral in polar coordinates.

9. Find the relative extrema and saddle points for the function $f(x,y) = x^3 + 3xy^2 - 3x^2 - 3y^2 + 4$.

10. Find parametric equations for the line tangent to the curve of intersection of the surfaces $x^2+2y^2+3z^2 = 36$ and $2x^2 - y^2 + z^2 = 7$ at the point (1,2,3).

11. Find an equation of the plane tangent to the surface $xyz - 4xz^3 + y^3 = 10$ at the point (-1,2,1). Then find the angle between this tangent plane and the $xy-$plane.

12. Find the maximum and minimum values of the function $f(x,y) = xy - x - y - 1$ on the closed triangular region bounded by the $x-axis$, $y-axis$ and the line $x+y=3$.