MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

SECTIONS 2.8 & 2.9 **Math 2000 Worksheet** WINTER 2020

For practice only. Not to be submitted.

1. Evaluate the following double integrals by rewriting them in polar coordinates.

   (a) $\displaystyle\int_{-4}^{4}\int_{0}^{\sqrt{16-y^2}} \sqrt{x^2+y^2+9}\,dx\,dy$

   (b) $\displaystyle\iint_D \sqrt{x^2+y^2}\,dA$ where D is the region inside the circle $x^2+(y-1)^2=1$

   (c) $\displaystyle\iint_D \frac{y^2}{x^2}\,dA$ where D is the part of the annulus (ring) $9 \le x^2+y^2 \le 25$ lying in the first quadrant and below the line $y=x$

2. Use a double integral in either Cartesian or polar coordinates to find the volume of each solid.

   (a) the solid bounded above by the curve $f(x,y) = 1-xy$, below by the xy-plane, and whose cross-section is the region bounded by the curves $y=x$ and $y=x^2$

   (b) the solid under the paraboloid $z = 3x^2+y^2$, above the xy-plane, and whose cross-section is the region bounded by the curves $y=x$ and $x=y^2-y$

   (c) the solid bounded by the surface $z=xy$, the cylinders $y=x^2$ and $x=y^2$, and the plane $z=0$

   (d) the solid that lies under the cone $z=\sqrt{x^2+y^2}$, above the xy-plane, and whose cross section is the annulus $4 \le x^2+y^2 \le 25$

   (e) the solid under the surface $z=1+xy$, above the xy-plane, and whose cross-section is the triangle with vertices $(1,1)$, $(4,1)$ and $(3,2)$

   (f) the solid bounded by the paraboloid $z=4-x^2-y^2$ and the xy-plane