**Problems**

**On double integrals in polar coordinates**

*Due date***: 15 Ashwin, 2081**

**Evaluate the iterated integral.**

**1.**

**Ans.**

**2.**

**Ans.** π

**3.**

**Ans.** *a*3

**4.**

**Ans.** π

**5.**

**Ans. 0**

**6.**

**Ans.** π

**Use a double integral in polar coordinates to find the area of the region described.**

**7.** The region enclosed by the cardioid *r* = 1 − cos *θ*.

**Ans. =** π

**8.** The region enclosed by the rose *r* = sin 2*θ*.

**Ans.** 4 **=** π

**9.** The region in the first quadrant bounded by *r* = 1 and

*r* = sin 2*θ*, with *π/*4 ≤ *θ* ≤ *π/*2.

**Ans. =** π

**10.** The region inside the circle *x*2 + *y*2 = 4 and to the right of the line *x* = 1.

**Ans.** 2 **=** π –

**Find the volume of the solid described.**

**11.** Inside of *x*2 + *y*2 + *z*2 = 9, outside of *x*2 + *y*2 =1

**Ans.**  = π

**12.**  Below *z* = , inside of *x*2 + *y*2 =2*y*, above *z* = 0

**Ans. =**

**13.** Below *z* = 1 – *x*2 – *y*2, inside of *x*2 + *y*2 – *x* = 0, above *z* = 0

**Ans. =** π

**14. I**nside the surface *r*2 + *z*2 = 4 and outside the surface *r* = 2 cos *θ*.

**Ans.**  + π

**Use polar coordinates to evaluate the double integral.**

**15.** ∫∫sin (*x*2 + *y*2) *dA***,** where *R* is the region enclosed by the circle *x*2 + *y*2 = 9.

**Ans.** π (1 – cos θ).

**16.** ∫∫ *dA*, where *R* is the region in the first quadrant within the circle *x*2 + *y*2 = 9.

**Ans.** π

**17.** ∫∫ *dA*, where *R* is the sector in the first quadrant

bounded by *y* = 0, *y* = *x*, and *x*2 + *y*2 = 4.

**Ans.** πln 5

**18.** ∫∫ 2*y* *dA*, where *R* is the region in the first quadrant bounded above by the circle (*x* − 1)2 + *y*2 = 1 and below

by the line *y* = *x*.

**Ans.** 1/3

**Evaluate the iterated integral by converting to polar coordinates.**

**Ans.** π

**Ans.** (1 – *e*–4)π

**Ans.**

**Ans.** π sin 1

**Ans.** π

**Ans.**

**Ans.** π( – 1)

**Ans.** – 128

**27.** Use a double integral in polar coordinates to find the volume of a cylinder of radius *a* and height *h*.

**Ans.** π*a*2*h*