



### Wir 9: Exam 3 Review

Sections 15.1-15.4, 15.6-15.9

**Problem 1.** Let  $R$  be the region in the  $xy$ -plane bounded by  $y = 2x$ ,  $x = 10$ , and  $y = -1$ . Set up but do not evaluate  $\iint_R (x^2 + y^2) dA$  in the order  $dy dx$  and  $dx dy$ .

**Problem 2.** Evaluate  $\int_0^3 \int_0^{\sqrt{9-x^2}} e^{-x^2-y^2} dy dx$

**Problem 3.** Let  $D$  be the region bounded by  $y = 0$ ,  $y = x^2$ , and  $x = 3$ . Find  $\iint_D 3x \cos y dA$ .

**Problem 4.** Compute  $\int_0^3 \int_{3y}^9 7e^{x^2} dx dy$ .

**Problem 5.** Let  $R$  be the region that lies to the left of the  $y$ -axis between the circles  $x^2 + y^2 = 1$  and  $x^2 + y^2 = 16$ . Find  $\iint_R 5(x + y)$ .

**Problem 6.** Find the volume of the solid that is above the  $xy$  plane, below the ellipsoid  $4x^2 + 4y^2 + z^2 = 64$  but inside the cylinder  $x^2 + y^2 = 9$ .

**Problem 7.** Let  $D$  be the triangular region with vertices  $(0, 1)$ ,  $(1, 2)$ , and  $(4, 1)$ . Set up but do not evaluate  $\iint_D 7y^2 dA$  in the order  $dy dx$  and  $dx dy$ .

**Problem 8.** Let  $D = \{(x, y) : 0 \leq x \leq 1, 0 \leq y \leq x^2\}$ . Evaluate  $\iint_D \frac{5y}{6x^5 + 1} dA$ .

**Problem 9.** Express  $\iiint_E f(x, y, z) dV$  in the order  $dy dz dx$  if  $E$  is the solid bounded by  $y = x^2$ ,  $z = 0$ ,  $y + 4z = 16$ .

**Problem 10.** Find the volume of the solid that is enclosed by the cylinder  $x^2 + y^2 = 9$  and the planes  $y + z = 12$  and  $z = 2$ .

**Problem 11.** Find the volume of the solid enclosed by the paraboloids  $y = x^2 + z^2$  and  $y = 32 - x^2 - z^2$ .

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Problem 12. Convert to Cylindrical:  $\int_{-9}^9 \int_{-\sqrt{81-y^2}}^{\sqrt{81-y^2}} \int_{\sqrt{x^2+y^2}}^{13} xz \, dz \, dx \, dy$ .

Problem 13. Find  $\int \int \int_E (x^2 + y^2 + z^2) \, dV$  where  $E$  is the part of the ball centered at the origin with radius 2 in the first octant.

Problem 14. Evaluate in spherical coordinates.  $\int_0^{10} \int_0^{\sqrt{100-x^2}} \int_{\sqrt{x^2+y^2}}^{\sqrt{200-x^2-y^2}} yz \, dz \, dy \, dx$

Problem 15. Let  $E$  be the region that lies between the spheres  $x^2 + y^2 + z^2 = 1$  and  $x^2 + y^2 + z^2 = 9$ . Set up but do not evaluate  $\int \int \int_E (x + y + z) \, dV$  in spherical coordinates.

Problem 16. Find the volume of the solid that lies within the sphere  $x^2 + y^2 + z^2 = 4$ , above the  $xy$  plane and below the cone  $z = \sqrt{x^2 + y^2}$ .

Problem 17. Let  $R$  be the triangular region with vertices  $(0, 0)$ ,  $(9, 1)$ ,  $(1, 9)$ . Using the transformation  $x = 9u + v$  and  $y = u + 9v$  find  $\int \int_R (x - 10y) \, dA$ .

Problem 18. Let  $R$  be the parallelogram enclosed by the lines  $x - 6y = 0$ ,  $x - 6y = 9$ ,  $6x - y = 7$ ,  $6x - y = 10$ . Using the transformation  $u = x - 6y$  and  $v = 6x - y$ , find  $\int \int_R 9 \frac{x-6y}{6x-y} \, dA$

Problem 19. Let  $R$  be the region bounded by  $25x^2 + 4y^2 = 100$ . Using the transformation  $x = 2u$  and  $y = 5v$ , find  $\int \int_R 4x^2 \, dA$ .