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 $\int\int_R (x^2 + y^2)\, dA$ 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 $\int\int_D 3x \cos y\, dA$.

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 $\int\int_R 5(x + y)$.

Problem 6. Find the volume of the sold 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 $\int\int_D 7y^2\, dA$ in the order $dy\, dx$ and $dx\, dy$.

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

With thanks to Amy Austin for generously sharing all of her WIR problems from last semester.

Problem 9. Express $\int\int\int_E f(x,y,z)\,dV$ in the order $dydzdx$ 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 $y = 32 - x^2 - z^2$.

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 $\int\int_R 4x^2 dA$.

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