

MATE 3063 assignment 9: sections 15.1, 15.2

You are responsible for all these problems. Write up ten of your choice.

86. Compute the double integral:

(a) $\int_1^2 \int_1^2 \left(\frac{x}{y} + \frac{y}{x} \right) dy dx$

(b) $\int_0^1 \int_0^1 \sqrt{x+y} dx dy$

(c) $\int_0^1 \int_0^1 xy \sqrt{x^2 + y^2} dx dy$. Hint: the inner integral involves $\int_0^1 y \sqrt{x^2 + y^2} dy$ (x is merely a factor). This requires a simple (not trigonometric) substitution.

87. Compute the double integral over the indicated region:

(a) $\iint_R x \cos(x+y) dA$, $R = [0, \pi/4] \times [0, \pi/3]$

(b) $\iint_R \frac{x}{1+xy} dA$, $R = [0, 1] \times [0, 1]$ (use partial fractions).

(c) $\iint_R \frac{1}{1+x+y} dA$, $R = [1, 2] \times [1, 4]$.

88-91. Exercises 36, 39, 42, 47 of §15.1.

§15.2:

92-93. Exercises 11,12. We used the terms “type x” and “type y”.

94. Evaluate the double integral over D :

(a) $\iint_D x \cos y dA$, D bounded by $y = 0$, $y = x^2$, $x = 1$.

(b) $\iint_D xy dA$, D is the quarter-disc bounded by $x = 0$, $y = 0$, $y = \sqrt{1-x^2}$ in the first quadrant.

(c) $\iint_D x^2 e^{xy} dA$, D bounded by $y = x$, $y = 0$, $x = 2$.

In some of these, the order of integration matters.

95. Find the volume of the solid:

(a) Enclosed by the paraboloid $z = x^2 + y^2 + 1$ and the planes $x = 0$, $y = 0$, $z = 0$,
 $x + y = 2$.

(b) Enclosed by the cylinders $z = x^2$, $y = |x|$ and the planes $z = 0$, $y = 4$.

96-97. Choose two of exercises 45–50.

98–101. Exercises 58, 59, 60, 64.

102. Exercise 68.