Difficulty guide for worksheet:	
C-level or B-level exam problem:	1a, 1b, 1c, 1d, 1f, 1h, 1j, 2b, 3a
A-level exam problem or challenge for extra study:	1e, 1g, 1i, 2a
beyond the scope and/or removed from syllabus:	1k, 1l, 3b

1. Calculate $\displaystyle\int_{\mathcal{D}} y\,dA$, where $\mathcal{D}$ is the domain

$$\mathcal{D} = \left\{(x,y) \in \mathbb{R}^2 : 0 \le x \le 1,\ x^2 \le y \le 4 - x^2\right\}$$

2. Let $\mathcal{T}$ be the triangle in the xy-plane with vertices $(3,0)$, $(0,6)$, and $(3,6)$. Calculate $\displaystyle\int_{\mathcal{T}} xy\,dA$.

3. Let $\mathcal{T}$ be the trapezoid in the xy-plane with vertices $(0,0)$, $(4,0)$, $(4,2)$, and $(2,2)$. Suppose $f(x,y)$ is continuous on $\mathcal{T}$. Write $\displaystyle\int_{\mathcal{T}} f(x,y)\,dA$ as an iterated integral, or sum of iterated integrals, in each possible order ($dydx$ and $dxdy$).

4. Let $\mathcal{R}$ be the region in the xy-plane bounded by $x^2 + y^2 = 4$ and $x = 1$. Calculate $\displaystyle\int_{\mathcal{R}} \frac{y}{x}\,dA$.

5. For each integral, sketch the domain of integration and express as an iterated integral in the opposite order. For parts (c) and (d), also evaluate the integral.

(a) $\displaystyle\int_0^8 \int_x^8 f(x,y)\,dydx$

(b) $\displaystyle\int_0^1 \int_{e^x}^e f(x,y)\,dydx$

(c) $\displaystyle\int_0^1 \int_y^1 \frac{\sin(x)}{x}\,dxdy$

(d) $\displaystyle\int_0^4 \int_{\sqrt{y}}^2 \sqrt{x^3+1}\,dxdy$

6. Let $\mathcal{R}$ be the region in the xy-plane bounded by $y = e^x$ and $y = e^{\sqrt{x}}$. Calculate the volume of the solid region below the graph of $z = \dfrac{1}{\ln(y)}$ and above $\mathcal{R}$.