Extra Practice Problems, Double Integrals

Given below is an area D in the plane. Set up the integral

$$\int\int_D f(x,y)\,dA$$

first in the most natural way, then change the order of integration (if possible). Need more information? Look at Section 15.3 of Stewart's Calculus, for example.

1. D is the region bounded below $y = 3x^2$ and above $y = 2 + x^2$.
2. D is the area bounded between $y = \sqrt{x}$ and $y = x^2$ and $0 \leq y \leq 1$.
3. D is the right half of the unit circle (in Quadrants I and IV).
4. D is the area bounded by $x \geq 0$, $y \geq 0$, $x + y \leq 3$, and $y \geq 2x$.
5. D is the area under the line $y = 2$ and above the parabola $y = x^2$.