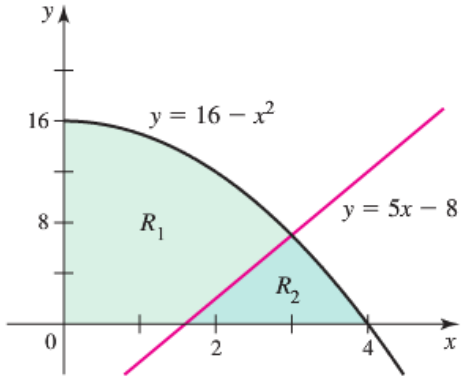
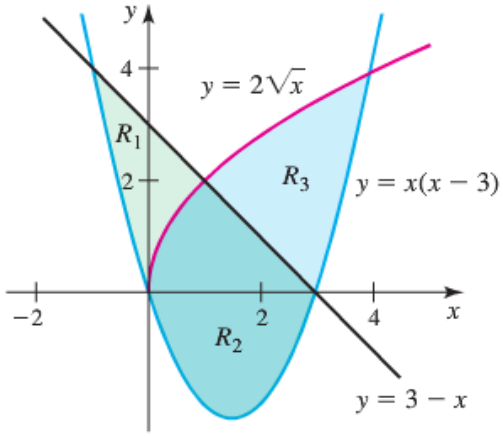
1. Find the area of the region in the first quadrant bounded by $y = x^p$ and $y = \sqrt[p]{x}$ where $p = 100$ and $p = 1000$

2. Find the area of the region in the first quadrant bounded by $y = 4x$ and $y = x\sqrt{25 - x^2}$

3. Find the area of the regions R_1 and R_2 (separately) shown in the figure, which are formed by the graphs of $y = 16 - x^2$ and $y = 5x - 8$



4. Find the area of the regions R_1, R_2 and R_3 (separately) shown in the figure, which are formed by the graphs of $y = 2\sqrt{x}$, $y = 3 - x$, and $y = x(x - 3)$



5. Find the area of the region between $y = \sin x$ and $y = x$ on the interval $[0,\ 2\pi]$

6. Find the area of the region bounded by $y = x^2$, $y = 2x^2 - 4x$ and $y = 0$

7. Find the area of the region in the first quadrant bounded by the curve $\sqrt{x} + \sqrt{y} = 1$

8. Find the area of the region in the first quadrant bounded by $y = \frac{x}{6}$ and $y = 1 - \left|\frac{x}{2} - 1\right|$

9. Consider the functions $y = \frac{x^2}{a}$ and $y = \sqrt{\frac{x}{a}}$, where $a > 0$. Find $A(a)$, the area of the region between the curves.