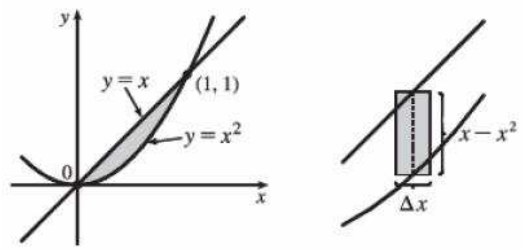
(2). $A = \int_0^2 (\sqrt{x+2} - \frac{1}{x+1} dx) = [\frac{2}{3}(x+2)^{\frac{3}{2}} - \ln(x+1)]_0^2 = \frac{16-4\sqrt{2}}{3} - \ln 3.$

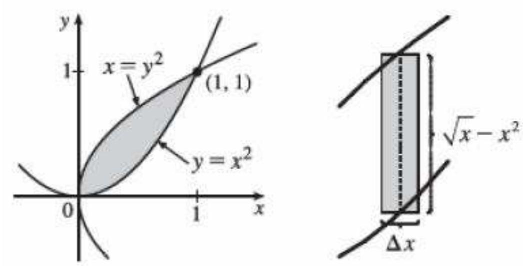
(3). $A = \int_{-1}^1 [e^y - (y^2-2)]dy = [e^y - \frac{1}{3}y^3 + 2y]_{-1}^1 = e - e^{-1} + \frac{10}{3}.$

(7). The curves intersect when $x = x^2 \Leftrightarrow x = 0$ or 1.



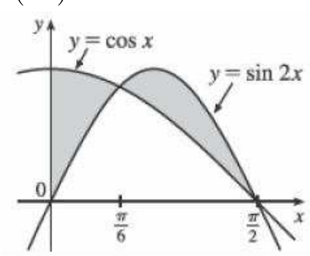
$A = \int_0^1 (x - x^2)dx = [\frac{1}{2}x^2 - \frac{1}{3}x^3]_0^1 = \frac{1}{6}.$

(11). The curves intersect at $(0,0)$ and $(1,1)$.



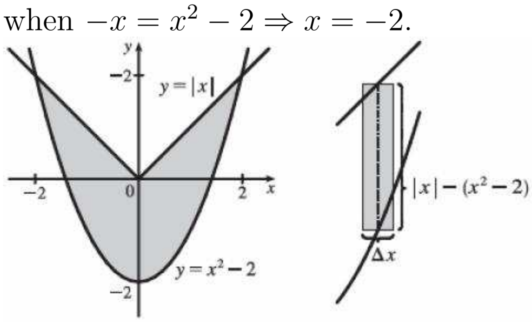
$A = \int_0^1 (\sqrt{x} - x^2)dx = [\frac{2}{3}x^{\frac{3}{2}} - \frac{1}{3}x^3]_0^1 = \frac{1}{3}.$

(23). The curves intersect at $\cos x = \sin 2x = 2\sin x \cos x \Leftrightarrow x = \frac{\pi}{6}$ or $\frac{\pi}{2}$.



$A = \int_0^{\frac{\pi}{6}} (\cos x - \sin 2x)dx + \int_{\frac{\pi}{6}}^{\frac{\pi}{2}} (\sin 2x - \cos x)dx$
$= [\sin x + \frac{1}{2}\cos 2x]_0^{\frac{\pi}{6}} + [-\frac{1}{2}\cos 2x - \sin x]_{\frac{\pi}{6}}^{\frac{\pi}{2}} = \frac{1}{2}.$

(26). For $x > 0$, curves intersect when $x = x^2 - 2 \Rightarrow x = 2$, for $x < 0$, curves intersect when $-x = x^2 - 2 \Rightarrow x = -2$.



$A = \int_{-2}^0 (-x - x^2 + 2)dx + \int_0^2 (x - x^2 + 2)dx = [-\frac{1}{2}x^2 - \frac{1}{3}x^3 + 2x]_{-2}^0 + [\frac{1}{2}x^2 - \frac{1}{3}x^3 + 2x]_0^2 = \frac{20}{3}.$

(42). $\Delta x = 2$, thus
$A \approx 2 \cdot [\frac{0+6.2}{2} + \frac{6.2+7.2}{2} + \frac{7.2+6.8}{2} + \frac{6.8+5.6}{2} + \frac{5.6+5.0}{2} + \frac{5.0+4.8}{2} + \frac{4.8+4.8}{2} + \frac{4.8+0}{2}] = 80.8(\mathrm{m}^2)$.

(45). The area under curve A between $t = 0$ and $t = x$ is $\int_0^x v_A(t)dt = s_A(x)$, where v_A is the velocity of car A and s_A is its displacement. Similarly for car B.

a. After one minute, the area under curve A is greater than the area under curve B, hence A is ahead.

b. The area of the shaded region is $s_A(x) - s_B(x)$, which is the distence of two cars after one minute.

c. Since the area of the orange region is greater than that of the white one, car A is still ahead.

d. In the first minute, the distance by which car A is ahead, seems to be about 3 squares. We estimate the time x such that the area between the curves for $1 \leq t \leq x$ is the same as the area for $0 \leq t \leq 1$. From the graph, $x \approx 2.2$, so the two cars are side by side at $t \approx 2.2$ minutes.