7.4

21 $y = \int_0^x \sqrt{\cos 2t}\, dt$

$\frac{dy}{dx} = \sqrt{\cos 2x}$

$s = \int_a^b \sqrt{1 + \left(\frac{dy}{dx}\right)^2}\, dx$

$s = \int_0^{\pi/4} \sqrt{1 + \left(\sqrt{\cos 2x}\right)^2}\, dx$

37 $y = x^{2/3}$ $[-1, 1]$

$\frac{dy}{dx} = \frac{2}{3} x^{-1/3}$

$s = \int_{-1}^{1} \sqrt{1 + \left(\frac{2}{3} x^{-1/3}\right)^2}\, dx$

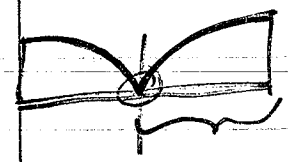
$y = (-1)^{2/3}$

$y = 1$

$y = (1)^{2/3} = 1$

$2\int_0^1 \sqrt{1 + \left(\frac{3}{2} y^{1/2}\right)^2}\, dy$

$2\int_0^1 \sqrt{1 + \frac{9}{4} y}\, dy$



$x = y^{3/2}$

$\frac{dx}{dy} = \frac{3}{2} y^{1/2}$

25 $y = x^{1/3} + x^{2/3}$ $[0, 2]$

$y = 0^{1/3} + 0^{2/3} = 0$

$y = 2^{1/3} + 2^{2/3}$

$0 = x^{2/3} + x^{1/3} - y$

$0 = (x^{1/3})^2 + x^{1/3} - y$

$x^{1/3} = \frac{-1 \pm \sqrt{1 - 4(-y)}}{2}$

$x = \left(\frac{-1}{2} + \frac{1}{2}\sqrt{1 + 4y}\right)^3$

$x = \left(\frac{1}{2}\left(-1 + \sqrt{1 + 4y}\right)\right)^3$

$x = \frac{1}{8}\left(\sqrt{1 + 4y} - 1\right)^3$

$x' = \frac{3}{4}\left(\sqrt{1 + 4y} - 1\right)^2 \left[\frac{1}{2}(1 + 4y)^{-1/2}\right]$

$= \frac{3}{4}\left(\sqrt{1 + 4y} - 1\right)^2 \left[(1 + 4y)^{-1/2}\right]$

$s = \int_0^{2^{1/3} + 2^{2/3}} \sqrt{1 + \left(\frac{3}{4}\left(\sqrt{1 + 4y} - 1\right)^2 \left[(1 + 4y)^{-1/2}\right]\right)}\, dy$

7.4

17] $x = \int_0^y \sqrt{\sec^4 t - 1}\, dt \qquad -\pi/4 \le y \le \pi/4$

$\frac{dx}{dy} = \sqrt{\sec^4 y - 1}$

$s = \int_{-\pi/4}^{\pi/4} \sqrt{1 + \left(\sqrt{\sec^4 y - 1}\right)^2}\, dy = 2$

$\frac{1}{\cancel{2}} \cdot \frac{\cancel{2}}{2} = \frac{1}{2}$

11] $y = (1/3)(x^2+2)^{3/2}$

$\frac{dy}{dx} = \frac{1}{\cancel{2}}(x^2+2)^{1/2}[\cancel{2}x]$

$= x(x^2+2)^{1/2}$

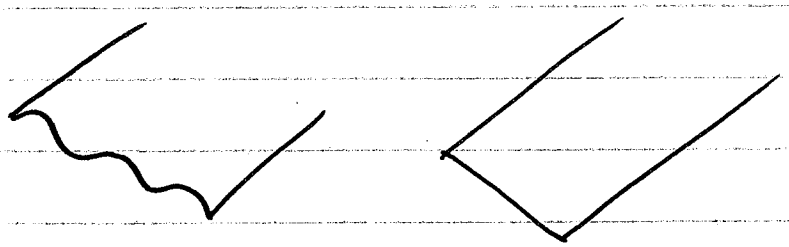
$s = \int_0^3 \sqrt{1 + (x(x^2+2)^{1/2})^2}\, dx = 12$

21] $y = \int_0^x \sqrt{\cos 2t}\, dt$

$\frac{dy}{dx} = \sqrt{\cos 2x}$

$s = \int_0^{\pi/4} \sqrt{1 + (\sqrt{\cos 2x})^2}\, dx = 1$

23]



$y = \sin\left(\frac{3\pi}{20}x\right)$

$\frac{dy}{dx} = \cos\left(\frac{3\pi}{20}x\right)\left[\frac{3\pi}{20}\right]$

$s = \int_0^{20} \sqrt{1 + \left(\frac{3\pi}{20}\cos\left(\frac{3\pi}{20}x\right)\right)^2}\, dx \approx 21.07 \text{ in.}$

7.4

12] $y = x^{3/2}$ $\quad 0 \le x \le 4$

$\frac{dy}{dx} = \frac{3}{2}x^{1/2}$

$s = \int_0^4 \sqrt{1 + \left(\frac{3}{2}x^{1/2}\right)^2}\, dx \approx 9.073$

5] $y^2 + 2y = 2x + 1$ $\quad (-1,-1),\ (7,3)$

$\underset{-1}{y^2+2y} = \underset{-1}{2x+1}$

$\frac{y^2+2y-1}{2} = \frac{2x}{2}$ $\quad s = \int_{-1}^{3} \sqrt{1 + (y+1)^2}\, dy \approx 9.394$

$\frac{1}{2}y^2 + y - \frac{1}{2} = x$

$y + 1 = \frac{dx}{dy}$