ex 39

$$L = \int_0^5 \sqrt{1+\left[\left(x^{3/2}\right)'\right]^2}\,dx = \int_0^5 \sqrt{1+\left(\frac{3}{2}x^{1/2}\right)^2}\,dx$$

$$= \int_0^5 \sqrt{1+\frac{9}{4}x}\,dx = \int_0^5 \left(1+\frac{9}{4}x\right)^{1/2}dx$$

$$= \frac{2}{3}\left(1+\frac{9}{4}x\right)^{3/2}\cdot\frac{4}{9}\Big|_0^5 = \frac{8}{27}\left(\sqrt{1+\frac{9}{4}x}\right)^3\Big|_0^5$$

$$= \frac{8}{27}\left[\left(\sqrt{1+\frac{45}{4}}\right)^3-\left(\sqrt{1+0}\right)^3\right]$$

$$= \frac{8}{27}\left[\left(\sqrt{\frac{49}{4}}\right)^3-1\right] = \frac{8}{27}\left[\left(\frac{7}{2}\right)^3-1\right] = \frac{8}{27}\left[\frac{343}{8}-1\right] = \frac{8}{27}\left[\frac{335}{8}\right] = \frac{335}{27}$$