$$\int (x+2)^{-3/5}\,dx = \frac{5}{2}(x+2)^{2/5} + C$$

8.4 (from notes)

Ex 5

$$\int_{-3}^{1} \frac{5}{(x+2)^{3/5}}\,dx$$

$$= \int_{-3}^{-2} \frac{5}{(x+2)^{3/5}}\,dx + \int_{-2}^{1} \frac{5}{(x+2)^{3/5}}\,dx$$

$$= \lim_{a\to -2^-} \int_{-3}^{a} \frac{5}{(x+2)^{3/5}}\,dx + \lim_{b\to -2^+} \int_{b}^{1} \frac{5}{(x+2)^{3/5}}\,dx$$

$$= \lim_{a\to -2^-} \left(\frac{25}{2}(x+2)^{2/5}\right)\Bigg|_{-3}^{a} + \lim_{b\to -2^+} \left(\frac{25}{2}(x+2)^{2/5}\right)\Bigg|_{b}^{1}$$

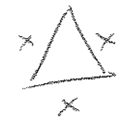
$$= \lim_{a\to -2^-} \underbrace{\left(\frac{25}{2}(a+2)^{2/5}\right)}_{0} - \frac{25}{2}(-1)^{2/5} + \frac{25}{2}(3)^{2/5} - \lim_{b\to -2^+} \underbrace{\left(\frac{25}{2}(b+2)^{2/5}\right)}_{0}$$

$$= \frac{-25}{2} + \frac{25}{2}\left(3^{2/5}\right) = \boxed{\frac{25}{2}\left(3^{2/5}-1\right)}$$

$\boxed{9.2 \ \# 33)}$

. . . .

area of equilateral triangle



$A = \frac{1}{2}(x)(\frac{\sqrt{3}}{2}h)$

$A = \frac{\sqrt{3}}{4}x^2$

(b) $A_0 = \frac{\sqrt{3}}{4}(9^2)$

$A_1 = \frac{\sqrt{3}}{4}(9^2) + 3\left(\frac{\sqrt{3}}{4}(3^2)\right)$

$A_2 = \frac{\sqrt{3}}{4}(9^2) + 3\left(\frac{\sqrt{3}}{4}(3^2)\right) + 12\left(\frac{\sqrt{3}}{4}(1^2)\right)$

$A_3 = \frac{\sqrt{3}}{4}(9^2) + 3\left(\frac{\sqrt{3}}{4}(3^2)\right) + 12\left(\frac{\sqrt{3}}{4}(1^2)\right) + 48\left(\frac{\sqrt{3}}{4}(\frac{1}{3})^2\right)$

$A_4 = \frac{\sqrt{3}}{4}(9^2) + 3\left(\frac{\sqrt{3}}{4}(3^2)\right) + 12\left(\frac{\sqrt{3}}{4}(1^2)\right) + 48\left(\frac{\sqrt{3}}{4}(\frac{1}{3})^2\right)$
$\qquad + 4(48)\left(\frac{\sqrt{3}}{4}\left(\frac{1}{9}\right)^2\right)$

$\vdots$

$$A_k = \underbrace{\frac{\sqrt{3}}{4}(9^2)}_{n=0} + \frac{\sqrt{3}}{4}\Big[\underbrace{3(3^2)}_{n=1} + \underbrace{4(3)(1^2)}_{n=2} + \underbrace{4(4(3))\left(\tfrac{1}{3}\right)^2}_{n=3} + \underbrace{4(4(4(3)))\left(\tfrac{1}{9}\right)^2}_{n=4} + \dots + 4^{k-1}(3)\left(\frac{1}{3^{k-2}}\right)^2\Big]$$

$$A_k = \frac{\sqrt{3}}{4}(9^2) + \frac{\sqrt{3}}{4}(3)\sum_{n=1}^{k} 4^{k-1}\left(\frac{1}{3^{k-2}}\right)^2$$

$$\iff A_k = \frac{81\sqrt{3}}{4} + \frac{3\sqrt{3}}{4}\sum_{n=1}^{k}\frac{4^{k-1}}{3^{2k-4}}$$

But

$$\frac{4^{k-1}}{3^{2k-4}} = \frac{1}{3^{-2}}\left[\frac{4^{k-1}}{3^{2k-2}}\right]$$

$$= 9\left[\frac{4^{k-1}}{(3^2)^{k-1}}\right]$$

$$= 9\left[\left(\frac{4}{9}\right)^{k-1}\right]$$

$$\iff A_k = \frac{81\sqrt{3}}{4} + \frac{27\sqrt{3}}{4}\underbrace{\sum_{n=1}^{k}\left(\frac{4}{9}\right)^{k-1}}_{\text{geometric series}}$$

total

$$\Rightarrow A = A_\infty = \frac{81\sqrt{3}}{4} + \frac{27\sqrt{3}}{4}\sum_{k=1}^{\infty}\left(\frac{4}{9}\right)^{k-1}$$

$$\iff A = \frac{81\sqrt{3}}{4} + \frac{27\sqrt{3}}{4}\left(\frac{1}{1-4/9}\right) = \frac{81\sqrt{3}}{4} + \frac{27\sqrt{3}}{4}\left(\frac{9}{5}\right) = \frac{648\sqrt{3}}{20} = \boxed{\frac{162\sqrt{3}}{5}}$$