Section 5.1

(42) d $\sum_{n=1}^{50}(1+n^2) = \sum_{n=1}^{50} 1 + \sum_{n=1}^{50} n^2 = 50 + \frac{50(50+1)(2\cdot 50+1)}{6} = 50 + \frac{50\cdot 51\cdot 101}{6}$

$= 50 + 25\cdot 17\cdot 101 = \boxed{42975}$

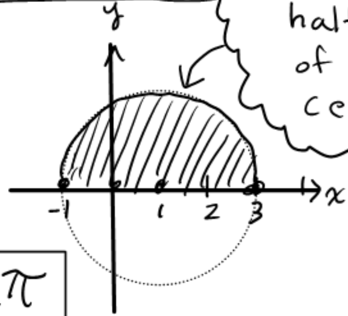
Section 5.2

(22) $\lim_{\Delta\to\infty} \sum_{K=1}^{n} (4 - x_k^{*2})\Delta x_k = \int_{-2}^{2} (4-x^2)\,dx = \left[4x - \frac{x^3}{3}\right]_{-2}^{2}$

on $[-2,2]$ $= \left(4\cdot 2 - \frac{2^3}{3}\right) - \left(4(-2) - \frac{(-2)^3}{3}\right) = \boxed{\frac{32}{3}}$

(30) $\int_{-1}^{3} \sqrt{4-(x-1)^2}\,dx$

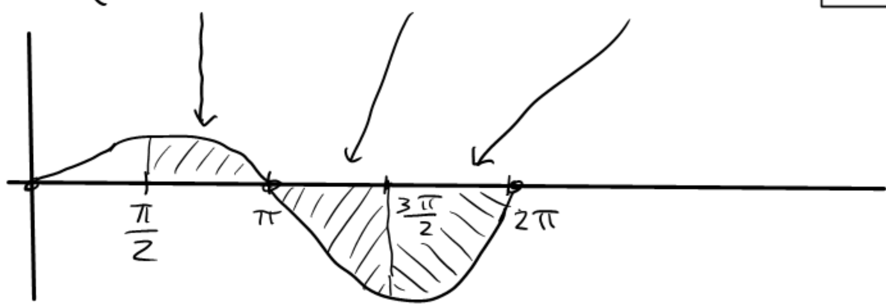
$y = \sqrt{2^2-(x-1)^2}$ is half a circle of radius 2, centered at $(1,0)$



$= \int_{-1}^{3} \sqrt{2^2-(x-1)^2}\,dx = \frac{1}{2}\pi 2^2 = \boxed{2\pi}$

(40) $\int_{\frac{\pi}{2}}^{2\pi} x\sin x\,dx = \int_{\frac{\pi}{2}}^{\pi} x\sin x\,dx + \int_{\pi}^{\frac{3\pi}{2}} x\sin x\,dx + \int_{\frac{3\pi}{2}}^{2\pi} x\sin x\,dx$

$= (\pi - 1) - (\pi + 1) - (2\pi - 1) = \boxed{-2\pi - 1}$



(42) Suppose $\int_1^4 f(x)\,dx = 8$ and $\int_1^6 f(x)\,dx = 5$.

ⓐ $\int_1^4 -3f(x)\,dx = -3\int_1^4 f(x)\,dx = -3\cdot 8 = \boxed{-24}$

ⓒ $\int_6^4 12f(x)\,dx = -\int_4^6 12f(x)\,dx = \int_1^4 12f(x)\,dx - \int_1^4 12f(x)\,dx - \int_4^6 12f(x)\,dx$

$= \int_1^4 12f(x)\,dx - \left(\int_1^4 12f(x)\,dx + \int_4^6 12f(x)\,dx\right)$

$= 12\int_1^4 f(x)\,dx - 12\int_1^6 f(x)\,dx = 12\cdot 8 - 12\cdot 5 = \boxed{36}$

Section 5.3

(30) $$\int_0^2 (3x^2+2x)\,dx = x^3 + x^2 \Big|_0^2 = (2^3+2^2)-(0^3+0^2) = \boxed{12}$$

(32) $$\int_0^{\pi/4} 2\cos(x)\,dx = 2\sin(x)\Big|_0^{\pi/4} = 2\sin\left(\tfrac{\pi}{4}\right) - 2\sin(0) = \boxed{\sqrt{2}}$$

(36) $$\int_0^{\ln 8} e^x\,dx = e^x\Big|_0^{\ln 8} = e^{\ln 8} - e^0 = 8 - 1 = \boxed{7}$$

(40) $$\int_0^{1/2} \frac{dx}{\sqrt{1-x^2}} = \sin^{-1}(x)\Big|_0^{\frac{1}{2}} = \sin^{-1}\left(\tfrac{1}{2}\right) - \sin^{-1}(0)$$

$$= \frac{\pi}{6} - 0 = \boxed{\frac{\pi}{6}}$$

(46) $$\int_4^9 \frac{x-\sqrt{x}}{x^3}\,dx = \int_4^9 \left(\frac{x}{x^3} - \frac{x^{1/2}}{x^3}\right)dx = \int_4^9 \left(x^{-2} - x^{-5/2}\right)dx$$

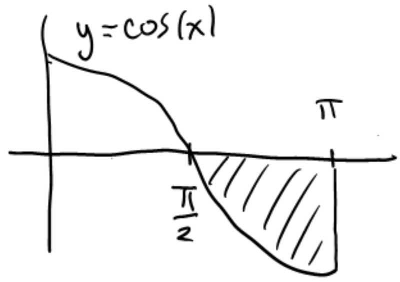
$$= \left[\frac{x^{-2+1}}{-2+1} - \frac{x^{-\frac{5}{2}+1}}{-\frac{5}{2}+1}\right]_4^9 = \left[-\frac{1}{x} + \frac{2}{3}\frac{1}{\sqrt{x}^3}\right]_4^9 = \left(-\frac{1}{9} + \frac{2}{3}\frac{1}{\sqrt{9}^3}\right) - \left(-\frac{1}{4} + \frac{2}{3}\frac{1}{\sqrt{4}^3}\right)$$

$$= -\frac{1}{9} + \frac{2}{81} + \frac{1}{4} - \frac{2}{24} = -\frac{9}{81} + \frac{2}{81} + \frac{3}{12} - \frac{1}{12} = -\frac{7}{81} + \frac{1}{6} = -\frac{14}{162} + \frac{27}{162} = \boxed{\frac{13}{162}}$$

(50) $$\int_{\pi/16}^{\pi/8} 8\csc^2(4x)\,dx = -8\,\frac{1}{4}\cot(4x)\Big|_{\pi/16}^{\pi/8}$$

$$= -2\cot\left(4\frac{\pi}{8}\right) - \left(-2\cot\left(4\frac{\pi}{16}\right)\right) = -2\cot\left(\frac{\pi}{2}\right) + 2\cot\left(\frac{\pi}{4}\right) = 0 + 2 = \boxed{2}$$

(60) $$\int_{\frac{\pi}{2}}^{\pi} \cos(x)\,dx = \sin(x)\Big|_{\pi/2}^{\pi}$$



$$= \sin(\pi) - \sin\left(\pi/2\right) = 0 - 1 = -1$$ (A down)

Thus area is $\boxed{\text{1 square unit}}$