5.4

17) $y = \int_{\sqrt{x}}^{0} \sin(r^2)\,dr = -\int_{0}^{\sqrt{x}} \sin(r^2)\,dr$

$x^{1/2}$

$\frac{dy}{dx} = -\sin(\sqrt{x})^2 \left[\frac{1}{2}x^{-1/2}\right]$

$= \frac{-\sin x}{2\sqrt{x}}$

53) $\int_0^x e^{-t^2}\,dt = 0.6$

43) $y = x^3 - 3x^2 + 2x \quad [0,2]$

67) $f(\underline{3}) = 4 \qquad \int_3^5 \ln(2+\sin t)\,dt$

5.4

17) $y = \int_{\sqrt{x}}^{0} \sin(r^2)\,dr$

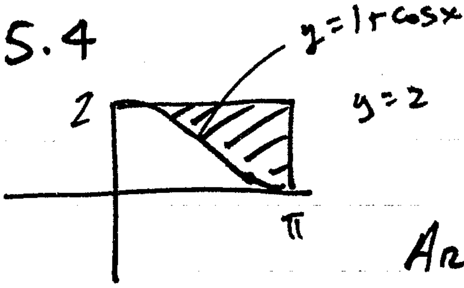
$y = -\int_{0}^{x^{1/2}} \sin(r^2)\,dr$

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

$= \frac{-\sin x}{2\sqrt{x}}$

24) $\int_{-3}^{x} \sqrt{3-\cos t}\,dt + 4$

5.4

47) 

AREA OF RECTANGLE $= 2\pi$

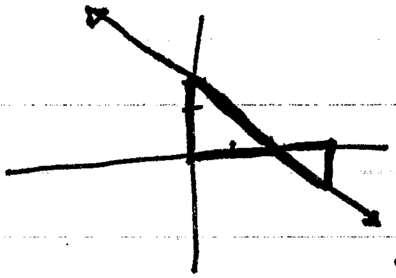
AREA UNDER THE CURVE : $\int_0^\pi (1+\cos x)\,dx$

$\Big|_0^\pi\ x + \sin x$

$[\pi + \sin\pi] - \cancel{[0 + \sin 0]} = \pi$

$2\pi - \pi = \pi$

41) $y = 2-x\ ,\quad 0 \le x \le 3$



$\int_0^2 (2-x)\,dx + \left|\int_2^3 (2-x)\,dx\right|$

$\Big|_0^2\ 2x - \frac{1}{2}x^2 + \left|\ \Big|_2^3\ 2x - \frac{1}{2}x^2\right|$

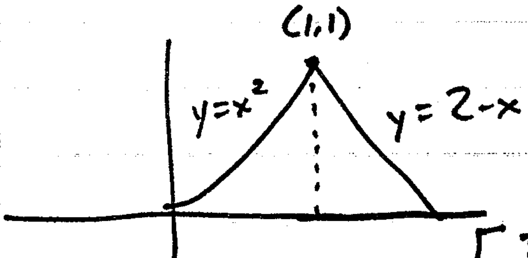
$\left[\left(2(2) - \frac{1}{2}(2)^2\right) - (0)\right] + \left|\left[\left(2(3) - \frac{1}{2}(3)^2\right) - \left(2(2) - \frac{1}{2}(2)^2\right)\right]\right|$

$[4-2] + \left|\left[\left(6 - \frac{9}{2}\right) - (4-2)\right]\right|$

$2 + \left|\left[\frac{3}{2} - 2\right]\right|$

$2 + \left|-\frac{1}{2}\right|$

$2 + \frac{1}{2} = 2\frac{1}{2}$

45) 

$\int_0^1 x^2\,dx + \int_1^2 (2-x)\,dx$

$\Big|_0^1\ \frac{1}{3}x^3 + \Big|_1^2\ 2x - \frac{1}{2}x^2$

$\left[\frac{1}{3}(1)^3 - \frac{1}{3}(0)^3\right] + \left[\left(2(2) - \frac{1}{2}(2)^2\right) - \left(2(1) - \frac{1}{2}(1)^2\right)\right]$

$\frac{1}{3} + \left[(4-2) - \left(2 - \frac{1}{2}\right)\right]$

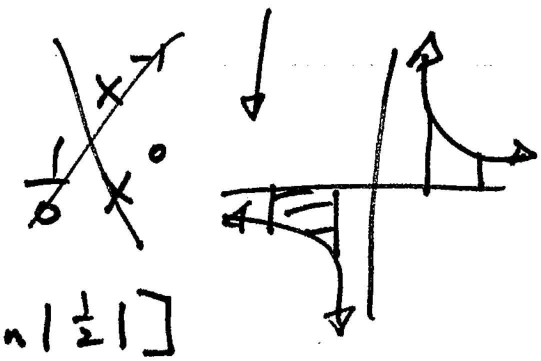
$\frac{1}{3} + \left[2 - \frac{3}{2}\right]$

$\frac{2}{6}\quad \frac{1}{3} + \frac{1}{2}\quad \frac{3}{6} = \frac{5}{6}$

5.4

27) $\int_{1/2}^{3} \left(2 - \frac{1}{x}\right) dx$

$\Big|_{1/2}^{3}\ 2x - \ln|x|$



$\left[\left(2(3) - \ln|3|\right)\right] - \left[2(1/2) - \ln\left|\frac{1}{2}\right|\right]$

$\left[6 - \ln 3\right] - \left[1 - \ln\frac{1}{2}\right]$

$5 - \ln 3 + \ln\frac{1}{2}$

$\boxed{5 + \ln\frac{1}{2} - \ln 3}$

$5 + \ln\left(\frac{1}{6}\right)$

$5 - \ln 6$

29) $\int_{0}^{1} \left(x^2 + \sqrt{x}\right) dx$

$\int_{0}^{1} \left(x^2 + x^{1/2}\right) dx$

$\Big|_{0}^{1}\ \frac{1}{3}x^3 + \frac{2}{3}x^{3/2}$

$\left[\frac{1}{3}(1)^3 + \frac{2}{3}(1)^{3/2}\right] - [0]$

$\frac{1}{3} + \frac{2}{3} = 1$

39) $\int_{-1}^{1} (r+1)^2\, dr$ $\qquad (r+1)(r+1)$

$\int_{-1}^{1} (r^2 + 2r + 1)\, dr$

$\Big|_{-1}^{1}\ \frac{1}{3}r^3 + r^2 + r$

$\left[\frac{1}{3}(1)^3 + \cancel{(1)^2} + 1\right] - \left[\frac{1}{3}(-1)^3 + \cancel{(-1)^2} + (-1)\right]$

$\frac{2}{3} + 2 = 2\frac{2}{3}$

5.4

15) $y = \int_{x^3}^{5} \frac{\cos t}{t^2+2}\,dt$

$y = -\int_{5}^{x^3} \frac{\cos t}{t^2+2}\,dt$

$\frac{dy}{dx} = -\frac{\cos x^3}{(x^3)^2+2}\left[3x^2\right]$

$= \frac{-3x^2 \cos x^3}{x^6+2}$

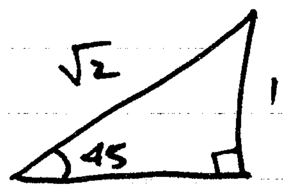
37) $\int_{\pi/4}^{3\pi/4} \csc x \cot x \, dx$

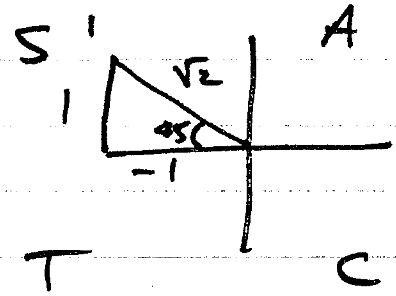
$\Big|_{\pi/4}^{3\pi/4} -\csc x$

$\left[-\csc\left(\frac{3\pi}{4}\right)\right] - \left[-\csc\left(\frac{\pi}{4}\right)\right]$

$\left[-\sqrt{2}\right] - \left[-\sqrt{2}\right]$

0



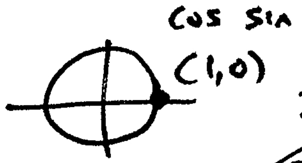


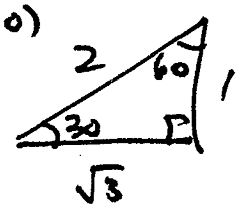
19) $\int_{x^2}^{x^3} \cos(2t)\,dt$

$\cos(2(x^3))\left[3x^2\right] - \cos(2(x^2))\left[2x\right]$

$\int_c^{x^3} + \int_{x^2}^{c} \quad 3x^2\cos(2x^3) - 2x\cos(2x^2)$

$\int_c^{x^3} - \int_c^{x^2}$





5.4

9) $y = \int_0^{x^2} e^{t^2}\,dt$

$\frac{dy}{dx} = e^{(x^2)^2}\,[2x]$

$= 2x e^{x^4}$

35) $\int_0^{\pi/3} 2\sec^2\theta\,d\theta$

$\left. 2\tan\theta \right|_0^{\pi/3}$

$[2\tan\frac{\pi}{3}] - [2\tan 0]$

$[2\sqrt{3}] - [0]$

$2\sqrt{3}$

5.4

20) $y = \int_{\sin x}^{\cos x} t^2\,dt$

$y = \int_{c}^{\cos x} t^2\,dt + \int_{\sin x}^{c} t^2\,dt$

$= \int_{c}^{\cos x} t^2\,dt - \int_{c}^{\sin x} t^2\,dt$

$\frac{dy}{dx} = \cos^2 x\,[-\sin x] - \sin^2 x\,[\cos x]$

$-\cos^2 x \sin x - \sin^2 x \cos x$

CHAPTER REVIEW

19) $\int_0^1 (8s^3 - 12s^2 + 5)\,ds$

$\Big|_0^1\ 2s^4 - 4s^3 + 5s$

$[2(1)^4 - 4(1)^3 + 5(1)] - 0$

3