MATH 150 HOMEWORK 1 SOLUTIONS

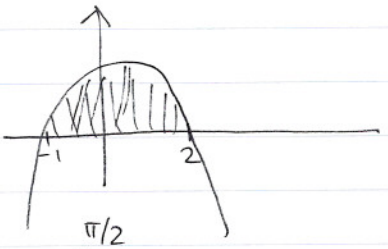
page 317 (Review Exercises for Chapter 4)

54) $\int_{-1}^{2} (-x^2+x+2)\,dx = -\frac{x^3}{3} + \frac{x^2}{2} + 2x \Big|_{-1}^{2} = \left(\frac{-8}{3} + \frac{4}{2} + 4\right) - \left(-\frac{-1}{3} + \frac{1}{2} - 2\right)$

$= \frac{10}{3} + \frac{7}{6} = \frac{27}{6} = \boxed{\frac{9}{2}}$

$y = -x^2+x+2$ (a parabola)

$y = -(x-2)(x+1)$



58) $y = x + \cos x$ $\quad$ Area $= \int_0^{\pi/2} (x+\cos x)\,dx = \frac{x^2}{2} + \sin x \Big|_0^{\pi/2}$

$= \left[\frac{\pi^2}{8} + \sin\left(\frac{\pi}{2}\right)\right] - [0 + \sin 0]$

$= \boxed{\frac{\pi^2+8}{8}}$

72) $\int \frac{x+3}{(x^2+6x-5)^2}\,dx$ $\quad u = x^2+6x-5 \Rightarrow du = (2x+6)\,dx$

$du = 2\cdot(x+3)\,dx$

$\frac{du}{2} = (x+3)\,dx$

$\int \frac{1}{u^2}\cdot\frac{du}{2} = \frac{1}{2}\int u^{-2}\,du = \frac{1}{2}\,\frac{u^{-1}}{-1} = -\frac{1}{2u} + C = \frac{-1}{2(x^2+6x+5)} + C$

74) $\int x \sin 3x^2\,dx$ $\quad u = 3x^2 \Rightarrow du = 6x\,dx$

$\frac{du}{6} = x\,dx$

$\int \sin u\,\frac{du}{6} = \frac{1}{6}\int \sin u\,du = \frac{1}{6}(-\cos u) + C = -\frac{\cos 3x^2}{6} + C$

91) $\int_1^9 x\sqrt[3]{x-1}\,dx$ $\quad u = x-1$ $\quad x = u+1$ $\quad x=1 \Rightarrow u=0$ $\quad x=9 \Rightarrow u=8$

$du = dx$

$\int_0^8 (u+1)\,u^{1/3}\,du = \int_0^8 (u^{4/3}+u^{1/3})\,du$

$= \frac{u^{\frac{4}{3}+1}}{\frac{4}{3}+1} + \frac{u^{\frac{1}{3}+1}}{\frac{1}{3}+1}\Big|_0^8 = \frac{3}{7}u^{7/3} + \frac{3}{4}u^{4/3}\Big|_0^8 = \left(\frac{3}{7}\,8^{7/3} + \frac{3}{4}\,8^{4/3}\right) - (0)$

$= \frac{3}{7}\cdot 2^7 + \frac{3}{4}\cdot 2^4$

$= \frac{384}{7} + 12 = \frac{468}{7}$