#27 [Corrections to Sec 4.4 HW]

$\int_0^4 |x^2-9|\,dx \Rightarrow$ cusp at $x=3 \Rightarrow$

$x^2-9=0 \Rightarrow x=3$ or $\cancel{x=-3}$

not in the interval $[0,4]$ determined by the limits of integration.

$\Rightarrow \int_0^3 |x^2-9|\,dx + \int_3^4 |x^2-9|\,dx$

$= \int_0^3 -(x^2-9)\,dx + \int_3^4 (x^2-9)\,dx$

$= \int_0^3 (-x^2+9)\,dx + \int_3^4 (x^2-9)\,dx$

$= \left[\frac{-x^3}{3}+9x\right]_0^3 + \left[\frac{x^3}{3}-9x\right]_3^4$

$= \left[\left(\frac{-(3)^3}{3}+9(3)\right)-\left(\frac{-(0)^3}{3}+9(0)\right)\right] + \left[\left(\frac{(4)^3}{3}-9(4)\right)-\left(\frac{(3)^3}{3}-9(3)\right)\right]$

$= \left[(-9+27)-(0+0)\right]+\left[\left(\frac{64}{3}-36\right)-(9-27)\right]$

$= [18]+\left[\left(\frac{64}{3}-36\right)-(-18)\right] = 18+\frac{64}{3}-36+18 = \boxed{\frac{64}{3}}$

#47 #49 (REGARDING THE EXAMS, YOU MAY IGNORE #47 & #49. BUT FOR THE RECORD, HERE ARE THE SOLUTIONS.

#47 The M.V.T. for integrals says there is c in $[a,b]$ such that $\int_a^b f(x)\,dx = f(c)(b-a)$

so for $f(x)=x^3$ on $[0,3]$

$\int_0^3 x^3\,dx = \left[\frac{x^4}{4}\right]_0^3$

$= \frac{81}{4}$

$f(c)=c^3$ and $(b-a)=(3-0)=3$

so $\frac{81}{4}=c^3(3)$

$\Rightarrow \frac{27}{4}=c^3$

$\Rightarrow c=\sqrt[3]{\frac{27}{4}} = \boxed{\frac{3}{\sqrt[3]{4}}} \approx \boxed{1.889}$

(#49). $f(x) = \frac{x^2}{4}$ $[0, 6]$

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$\int_0^6 \frac{x^2}{4} dx = \left[\frac{x^3}{12}\right]_0^6$

$= \frac{(6)^3}{12}$

$= 18$

$f(c) = \frac{c^2}{4}$ $(b-a) = (6-0) = 6$

so

$18 = \frac{c^2}{4}(6)$

$\Rightarrow c^2 = 12$

$\Rightarrow c = \pm\sqrt{12}$ choose the one in $[0, 6]$ $\Rightarrow$ $\boxed{c = \sqrt{12} \approx 3.46}$