CHAPTER 7 Review

#1 $x(6) = x(0) + \int_0^6 v(t)\,dt$

$x(6) = 4 + \int_0^6 2(t^2+2)^3\,dt = 4 + 100{,}468.1143 = \boxed{100{,}472.1143}$

#2 $v(t) = \int a(t)\,dt = \int 3\cos t\,dt = 3\sin t + C$

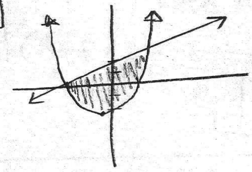
$v(0) = 4$, $\therefore$ $4 = 3\sin(0) + C$ $\Rightarrow$ $v(t) = 3\sin t + 4$

$4 = C$ $\qquad v(\pi) = 3\sin\pi + 4 = \boxed{4}$

#3 Beg. of 1990: $t=0$, Beg of 1992: $t=2$, Beg. of 1998: $t=8$

$\int_2^8 P(t)\,dt = \int_2^8 25000(1.089)^t\,dt = \boxed{232{,}250.074}$

#4



$A = \int$ Top function $-$ Bottom function

$A = \int_{-2}^{2}\left[(x+2)-(x^2+x-2)\right]dx$

$= \int_{-2}^{2}(-x^2+4)\,dx = \left[-\frac{x^3}{3}+4x\right]_{-2}^{2}$

$= \left(-\frac{8}{3}+8\right) - \left(\frac{8}{3}-8\right) = -\frac{16}{3} + 16 = \boxed{\frac{32}{3}u^2}$

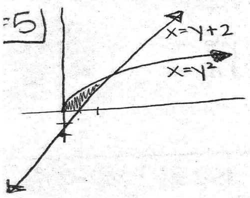
Limits of Integration

$x^2+x-2 = x+2$

$x^2 = 4$

$x = \pm 2$

#5



Two options: Split & integrate (dx)

Integrate dy *

$A = \int_0^2\left[(y+2)-y^2\right]dy = \int_0^2 (y+2-y^2)\,dy$

$= \left[\frac{y^2}{2}+2y-\frac{y^3}{3}\right]_0^2 = \left[\left(2+4-\frac{8}{3}\right)-(0)\right] = \boxed{\frac{10}{3}u^2}$

Limits of Int:

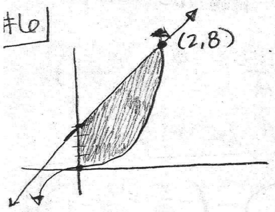
$y^2 = y+2$

$y^2-y-2=0$

$(y-2)(y+1)=0$

$y=2$ $\quad \cancel{y=-1}$

#6



$A = \int_0^2\left[(2x+4)-x^3\right]dx = \int_0^2 (2x+4-x^3)\,dx$

$= \left[x^2+4x-\frac{x^4}{4}\right]_0^2 = (4+8-4)-(0) = \boxed{8u^2}$

* On this one → just plug in points to find the intersection. There are none on your test that can't be factored. :)