BC 2005 Form B #6

a. $\int_0^k 1/(x+2\,)\,dx = \ \ln(|x+21|)_0^k \ = \ \ln(|k+21|) - \ln(|21|)$

b. $\int_0^k \pi(1/(x+2))^2\,dx = \pi\int_0^k (1/(x+2))^2 dx \ = -\pi(1/(x+2))\,{}_0^k$

$= \ -\pi/(k+2) \ - \ (-\pi(1/(2)))$

c. $\int_k^\infty \pi(1/(x+2))^2 dx \ = \ \pi\int_k^\infty (x+2)^{-2} dx \ = \ \ -\pi(1/x+2)_k^\infty$

= $\lim_{x\to\infty} -\pi(1/(x+2)) \ - \ (-\pi(1/(k+2))) \ = \ \pi/(k+2)$

= $V_R = \ V_S,(\pi/(k+2)) \ = \ (\pi/2) - \pi/(k+2)$

= $2(\pi/(k+2)) = \ \pi/2$

= $2/(k+2) = \ 1/2$

= $4 = \ (k+2),\ k=2$

At k=2, the volume of the figure rotated in the area of R and the area of S will be the same.

BC 2009 Form B #1

a. $30*20 \ - \ \int_0^{30} 20\sin(\pi x/30)dx$ = $218.028cm^2$

b. $\pi/2\int_0^{30}\left(\frac{20\sin(\pi x/30)}{2}\right)^2 dx \ = 2356.194$

$2356.194 * .05 = 117.809 \ grams$

c. $\int_0^{30}\sqrt{(1)+(f'(x))^2}dx \ + \ 30$ = $81.803\,cm$

BC 2003 #3 parts (a) and (b) only

a. $5/3y = \ \sqrt{(1+y^2)}\ ,\ y = \ 3/4\,and\,x = 5/4$

$dx/dy \ = \ d/dy * x \ = \ d/dy\sqrt{(1+y^2)}$

$= \ 1/2\,(1+y^2)^{-.5} * 2y \ = \ y/\sqrt{1+y^2} \ = \ y/x \ = \ (3/4)/(5/4) \ = \ 3/5$

b. $\int_0^{3/4}\left(\left(\sqrt{(1+y^2)}\right) \ - \ 5/3y \ \right)dy \ = \ .347$

BC 2011 Form B #4

a. $-10/(5-0) = \; -2$

b. $\int_0^{10} 3f(x) + 2\,dx \; = \int_0^5 3f(x) \; + 2\,dx \; + \; \int_5^{10} 3f(x) \; + \; 2dx$
   $10 + 3(-10) \; + \; 10 + 3(27) \; = \; 71$

c. $g'(x) = \; f(x)$, f is increasing on (3,8), f<0 on (0,5). The intersection of these two bounds is the solution, which is (3,5).

d. $\int_0^{20} \sqrt{\left(1 + (h'(x))^2\right)}\,dx \; = \; \int_0^{20} \sqrt{\left(1 + (f'(x/2))^2\right)}dx$
   Let u= x/2, du = dx/2
   $2\int_0^{20} \sqrt{(1 + f'(x/2))^2} * .5dx \; = \; 2\int_0^{10} \sqrt{1 + f'(u)^2}du \; = \; 2 * \int_0^5 \sqrt{(1 + f'(u))^2} + 2 * \int_5^{10} \sqrt{\left(1 + f'(u)^2\right)}$
   = 2*11+ 2*18 = 58