1. Approximate the definite integral using left Reimann sum, right Reimann sum, and midpoint Reimann sum with 4 equal subintervals.

$\int_0^2 x\sqrt{3-x}\,dx$

$\Delta x = \frac{2-0}{4} = \frac{1}{2}$

x	0	$\frac{1}{2}$	1	1.5	2
$f(x)$	0	$.791$	$\sqrt{2}$	1.837	2

x	$\frac{1}{4}$	$\frac{3}{4}$	1.25	1.75
$f(x)$	$.415$	1.125	1.654	1.957

Left $= \frac{1}{2}(0 + .791 + \sqrt{2} + 1.837) = 2.021$

Right $= \frac{1}{2}(2 + 1.837 + \sqrt{2} + .791) = 3.021$

Midpt $= \frac{1}{2}(.415 + 1.125 + 1.654 + 1.957) = 2.575$

Don't round until final answer ☺

2. Approximate $\int_0^8 f(x)dx$ using a right Reimann sum of four subintervals. Is this an overapproximation? Explain.

x	0	1	3	7	8
$f(x)$	0	4	18	70	88

$\int_0^8 f(x)dx = 1(88) + 4(70) + 2(18) + 1(4)$

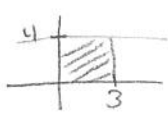
$= 88 + 280 + 36 + 4$

$= 408$

overapproximation for right Rieman sum b/c $f(x)$ inc on $(0,8)$

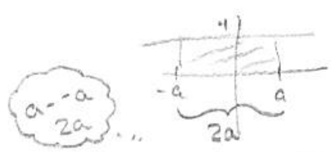
3. Sketch the region whose area is given by the definite integral. Then evaluate the integral.

a) $\int_0^3 4\,dx$



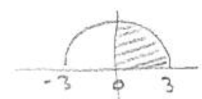
$3(4) = \boxed{12}$

b) $\int_{-a}^{a} 4\,dx$



$2a(4) = \boxed{8a}$

c) $\int_0^3 \sqrt{9-x^2}\,dx$



$\frac{\pi(3)^2}{4} = \boxed{\frac{9\pi}{4}}$

4. If $\int_2^4 x^3\,dx = 60$, $\int_2^4 x\,dx = 6$, and $\int_2^4 dx = 2$, then evaluate the integrals.

a) $\int_4^2 x\,dx$

$-\int_2^4 x\,dx = \boxed{-6}$

b) $\int_2^4 4x\,dx$

$= 4\int_2^4 x\,dx$

$= 4(6) = \boxed{24}$

c) $\int_2^4 (x^3 + 4x)\,dx$

$= \int_2^4 x^3 dx + 4\int_2^4 x\,dx$

$= 60 + 4(6)$

$= \boxed{84}$