

8. (3 points each) Let

- $\int_a^b f(x)dx = 8$ , and  $\int_a^b (f(x))^2 dx = 12$ ,

- $\int_a^b g(t)dt = 2$ , and  $\int_a^b (g(t))^2 dt = 3$ .

Evaluate the following integrals, if the value can be determined. If there is information missing, clearly state what is missing.

(a)  $\int_a^b (f(x) + g(x))dx = \int_a^b f(x)dx + \int_a^b g(x)dx = 8 + 2 = \boxed{10}$

(b)  $\int_a^b cf(z)dz$ , for  $c$  a constant  $= c \int_a^b f(z)dz = \boxed{8c}$

(c)  $\int_a^b (f(x))^2 - g(x^2) dx = \int_a^b (f(x))^2 dx - \int_a^b g(x^2) dx$   
 $= 12 - \int_a^b g(x^2) dx$   
 But we don't know this!

9. (6 points) Find  $\int_2^5 f(x)dx$ , if  $\int_2^5 (3f(x) + 4)dx = 18$ .

Let  $I = \int_2^5 f(x)dx$

$18 = \int_2^5 (3f(x) + 4) dx = \int_2^5 3f(x) dx + \int_2^5 4 dx$

$= 3 \int_2^5 f(x) dx + 4(5-2) = 3I + 12$

So  $I = \frac{18-12}{3} = \boxed{2}$ .