

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

AP CALCULUS Worksheet – Evaluating Definite Integrals

1)  $\int_0^1 2x \, dx$

1

2)  $\int_{-1}^0 (x - 2) \, dx$

 $-\frac{5}{2}$ 

3)  $\int_{-1}^1 (t^2 - 2) \, dt$

 $-\frac{10}{3}$ 

4)  $\int_0^1 (2t - 1)^2 \, dt$

 $\frac{1}{3}$ 

5)  $\int_1^2 \left(\frac{3}{x^2} - 1\right) \, dx$

 $\frac{1}{2}$ 

6)  $\int_{-1}^1 (t^{1/3} - 2) \, dt$

-4

$$7) \int_{-1}^0 (t^{1/3} - t^{2/3}) dt$$

$$\frac{-27}{20}$$

$$8) \int_{-1}^4 |2x - 4| dx$$

$$13$$

$$9) \int_0^\pi (1 + \sin x) dx$$

$$\begin{aligned} & x - \cos x \Big|_0^\pi \\ & (\pi - \cos \pi) - (0 - \cos 0) \\ & \pi + 1 - 0 + 1 \\ & \pi + 2 \end{aligned}$$

$$10) \int_{-\pi/6}^{\pi/6} (\sec^2 x) dx$$

$$\begin{aligned} & \tan x \Big|_{-\pi/6}^{\pi/6} \\ & \tan \pi/6 - \tan(-\pi/6) \end{aligned}$$

$$\frac{2\sqrt{3}}{3}$$

Net signed

$$11) \int_{-\pi/3}^{\pi/3} (4 \sec \theta \tan \theta) d\theta$$

$$\begin{aligned} & 4 \sec \theta \Big|_{-\pi/3}^{\pi/3} \\ & 4 [\sec \pi/3 - \sec(-\pi/3)] \\ & 4(2 - 2) \end{aligned}$$

$$0$$

12) What is the ~~exact~~ area of the region between  $y = x - x^2$  and the  $x$ -axis, over the interval  $[0, 1]$ ?

$$\int_0^1 (x - x^2) dx$$

$$\frac{1}{6}$$

13) What is the <sup>total</sup> ~~exact~~ area of the region between  $y = \cos x$  and the  $x$ -axis, over the interval  $\left[0, \frac{\pi}{2}\right]$ ?

$$\int_0^{\frac{\pi}{2}} |\cos x| dx$$

1

For #14 – 19: Suppose that  $f$  and  $g$  are continuous functions with the below given information, then use the properties of definite integrals to evaluate each expression.

$$\int_1^2 f(x) dx = -4, \quad \int_1^5 f(x) dx = 6, \quad \int_1^5 g(x) dx = 8$$

14)  $\int_2^2 g(x) dx$

0

17)  $\int_2^5 f(x) dx$   
 $\int_1^5 - \int_1^2$

10

15)  $\int_5^1 g(x) dx$

-8

18)  $\int_1^5 [f(x) + g(x)] dx$

14

16)  $\int_1^2 3 f(x) dx$

-12

19)  $\int_1^5 [4 f(x) - g(x)] dx$

4(6) - 8

24 - 8

16

For #20 – 26: Suppose that  $f$  and  $g$  are continuous functions with the below given information, then use the properties of definite integrals to evaluate each expression.

$$\int_1^9 f(x) dx = -1, \quad \int_7^9 f(x) dx = 5, \quad \int_7^9 h(x) dx = 4$$

20)  $\int_9^1 f(x) dx$

$$1$$

24)  $\int_7^9 [f(x) + h(x)] dx$

$$5 + 4$$

$$9$$

21)  $\int_1^7 f(x) dx$

$$\int_1^9 - \int_7^9$$
$$-1 - 5 = -6$$

25)  $\int_7^9 [2f(x) - 3h(x)] dx$

$$2(5) - 3(4)$$

$$10 - 12$$

$$-2$$

22)  $\int_9^7 [h(x) - f(x)] dx$

$$\int_7^9 [h(x) - f(x)] = 4 - 5 = -1$$

$$1$$

23)  $\int_1^9 -2f(x) dx$

$$-2(-1)$$

$$2$$