

Wkst 1: FTC

$$1) \int (2+x^{-2}) dx = 2x - \frac{1}{x} + C$$

$$6 = 2x - \frac{1}{x} + C$$

$$6 = 2 - 1 + C$$

$$y = 2x - \frac{1}{x} + 5 \quad C = 5$$

$$y(3) = 2(3) - \frac{1}{3} + 5 = \frac{32}{3}$$

OR

$$\int_1^3 (2+x^{-2}) dx = F(3) - F(1)$$

$$F(1) + \int_1^3 (2+x^{-2}) dx = F(3)$$

$$6 + \left(2x + \frac{1}{x} \Big|_1^3 \right) = F(3)$$

$$6 + \left(6 - \frac{1}{3} \right) - \left(2 - 1 \right)$$

$$6 + \frac{14}{3} = \frac{32}{3}$$

$$2) \int \cos 2x dx = \frac{1}{2} \sin 2x + C$$

$$3 = \frac{1}{2} \sin 0 + C$$

$$C = 3$$

$$y = \frac{1}{2} \sin 2x + 3$$

$$y\left(\frac{\pi}{4}\right) = \frac{1}{2} \sin\left(2 \cdot \frac{\pi}{4}\right) + 3$$

$$y\left(\frac{\pi}{4}\right) = \frac{1}{2} + 3$$

$$= \frac{7}{2}$$

$$\int_0^{\frac{\pi}{4}} \cos 2x dx = F\left(\frac{\pi}{4}\right) - F(0)$$

$$3 + \int_0^{\frac{\pi}{4}} \cos 2x dx = F\left(\frac{\pi}{4}\right)$$

$$3 + \left(\frac{1}{2} \sin 2x \Big|_0^{\frac{\pi}{4}} \right) = F\left(\frac{\pi}{4}\right)$$

$$3 + \left(\frac{1}{2} - 0 \right) = F\left(\frac{\pi}{4}\right)$$

$$= \frac{7}{2}$$

$$3) \int_0^1 \cos x^2 dx = F(1) - F(0) \quad 7) \int_0^3 \frac{t}{1+t^2} dt = F(3) - F(0)$$

$$F(0) + \int_0^1 \cos x^2 dx = F(1)$$

$$2 + \int_0^1 \cos x^2 dx = F(1)$$

$$\text{Calc: } F(1) = 2.932$$

$$5 + \int_0^3 \frac{t}{1+t^2} dt = F(3)$$

$$F(3) = 6.151$$

$$8) 3 + 6.2 = 9.2$$

$$9) \int_{-4}^4 f(x) dx = F(4) - F(-4)$$

$$\frac{1}{2} \pi (4)^2 = 7 - F(-4)$$

$$8\pi = 7 - F(-4)$$

$$8\pi - 7 = -F(-4)$$

$$F(-4) = 7 - 8\pi$$

$$4) \int_2^5 e^{-x^2} dx = F(5) - F(2)$$

$$\int_2^5 e^{-x^2} dx = 1 - F(2)$$

$$F(2) = .996$$

$$5) v(t) = 5 \sin t^2$$

$$\int_6^7 5 \sin(t^2) dt = F(7) - F(6)$$

$$4 + \int_6^7 5 \sin(t^2) dt = F(7)$$

$$F(7) = 3.837$$

$$10) a) \frac{1}{2} (9)(3) + 5$$

$$= \frac{9}{2} + 5$$

$$= \frac{19}{2}$$

$$b) \frac{1}{2} (3)(3) + 5 +$$

$$(-\frac{1}{2} (3)(2)) = 6.5$$

$$c) 5 + \frac{9}{2} + (-3) +$$

$$a) 10.099 \text{ miL} \quad \frac{1}{2} (\pi \cdot 2^2) =$$

$$b) 14.099 \text{ miL} \quad 6.5 + 2\pi$$

$$6) \int_0^3 2^t dt = F(3) - F(0)$$

$$4 + \int_0^3 2^t dt = F(3)$$

$$11) a) \int_2^6 f(x) dx = 5 \quad b) 6.5$$

$$12) -\frac{1}{2}(12)(50) + \frac{1}{2}(6)(100) + \frac{1}{2}(12)(100+150) \\ -300 + 300 + 1500 + 12,000 \\ = 13,500$$

$$13) \int_0^{10} -7e^{-0.3t} + 90 = 67.828^\circ$$

$$14) \int_0^2 F'(x) dx = F(2) - F(0) \\ F(2) = 3 + 2 = 5$$

$$\int_2^6 F'(x) dx = F(6) - F(2) \\ -7 = F(6) - 3 \\ -4 = F(6)$$

$$\int_6^8 F'(x) dx = F(8) - F(6) \\ 4 = F(8) - (-4) \\ 4 = F(8) + 4 \\ F(8) = 0$$

WKst #2: FTC

$$1) \int_1^4 f'(x) dx = F(4) - F(1)$$

$$17 = F(4) - 12$$

$$F(4) = 29$$

$$2) 2 \int_2^5 f(x) dx + \int_2^5 3 dx = 17$$

$$2 \int_2^5 f(x) dx + (3x \Big|_2^5) = 17$$

$$2 \int_2^5 f(x) dx + 9 = 17$$

$$2 \int_2^5 f(x) dx = 8$$

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

$$3) 1000 - \int_0^{60} 5 - 5e^{-0.12t} dt$$

$$= 741.636 \text{ liters}$$

$$4) \int_0^2 f'(x) dx = F(2) - F(0)$$

$$36 = F(2) - 100$$

$$a) F(2) = 136$$

$$b) 2(18) + 2(23)$$

$$82 = F(4) - 100$$

$$F(4) = 182$$

$$c) 2(18) + 2(23) + 2(25)$$

$$132 = F(6) - 100 \quad F(6) = 232$$

$$5) a) \int_0^5 f(x) dx + \int_0^5 2 dx$$

$$4 + (2x \Big|_0^5)$$

$$4 + 10 = 14$$

b)

$$\int_{-2}^3 f(x+2) dx = F(5) - F(0)$$

$$= 4$$

$$c) \int_{-5}^5 f(x) dx = 8$$

even

$$d) \int_{-5}^5 f(x) dx = 0$$

odd

b) a) $2 - 1 = 1$ b) $2 + (-2) = 0$

c) $2 + (-\frac{1}{2}(1)(3+2)) = 2 - \frac{5}{2} = -\frac{1}{2}$

d) $2 + (-\frac{5}{2}) + \frac{1}{2} = 0$

e) $2 + (-\frac{5}{2}) + \frac{1}{2} + 1 = 1$

7) a) $5 + 16 = 21$

$5 + 16 - 8 = 13$

$5 + 16 - 8 + 2 = 15$

Inc:
b) $(0, 2), (4, 5)$
of slope is positive
of $G(t)$

Dec: $(2, 4)$

slope is negative
of $G(t)$

c) cc \uparrow :

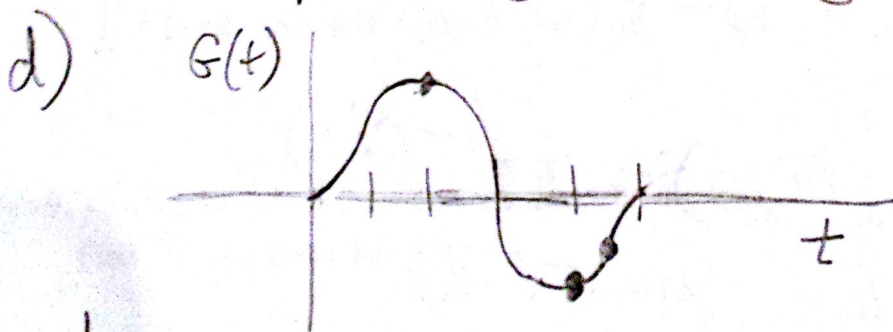
$(0, 1), (3, 4.5)$

slope of $g(t)$ is pos

cc \downarrow :

$(1, 3), (4, 5, 5)$

slope of $g(t)$ is neg



8)

$$\int_0^1 e^{-x^2} dx = F(1) - F(0)$$
$$F(1) = 2.747$$

$$9) \int_{\frac{1}{2}}^1 2x dx + \int_1^5 2 dx \quad 12) C$$

$$x^2 \Big|_{\frac{1}{2}}^1 + 2x \Big|_1^5$$

$$= \left(1 - \frac{1}{4}\right) + (10 - 2)$$

$$\frac{3}{4} + \frac{32}{4} = \frac{35}{4}$$

$$13) \int_1^3 \sqrt{x^2+2} dx = F(3) - F(1)$$

$$= 5 - F(1)$$

B

$$14) \int_1^3 f(x) dx = F(3) - F(1)$$

$$2.3 = F(3) - F(1)$$

$$2.3 = F(3) - 2$$

$$F(3) = 4.3$$

D

$$10) a) \int_0^{12} T'(x) dx = F(12) - F(0)$$

$$= 93 - 105$$

$$= -12^\circ F$$

$$b) \frac{97-99}{8-5} = -\frac{2}{3}^\circ F/\text{min}$$

$$\int_0^3 f(x) dx = F(3) - F(0)$$

$$4.3 - 0$$

$$= 4.3$$

$$11) a) \int_{-2}^1 f(x) dx = F(1) - F(-2)$$

$$-\frac{1}{2}(2)(4) + \frac{1}{2}(1)(2) = 4 - F(-2)$$

$$-4 + 1 = 4 - F(-2)$$

$$-3 = 4 - F(-2)$$

$$b) \int_{-2}^5 f(x) dx = F(5) - F(-2)$$

$$-3 + \left(8 - \frac{1}{2}\pi(2)^2\right) = F(5) - F(-2)$$

$$-3 + 8 - 2\pi = F(5) - 7 \quad F(5) = 12 - 2\pi$$