Review Key

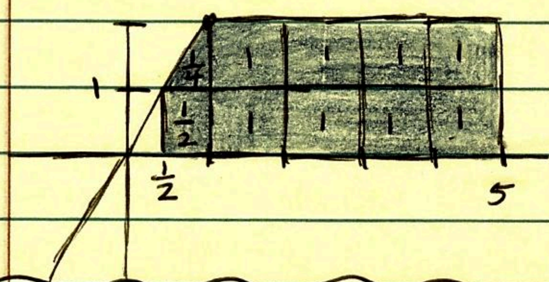
A. 1. $\int (6x^2 - 5 + 7x^{-2})\,dx = \boxed{2x^3 - 5x - \frac{7}{x} + C}$

2. $\int (6x^2 - 13x - 5)\,dx = \boxed{2x^3 - \frac{13x^2}{2} - 5x + C}$

3. $\boxed{= 5x + \sec x - \tan x + C}$

4. $= 2\sin x \Big|_0^{\frac{\pi}{2}} = 2(1) - 2(0) = \boxed{2}$

5. $\int_1^4 \left(\frac{3x^2}{x} - \frac{x^{\frac{1}{2}}}{x}\right)dx = \int_1^4 (3x - x^{-1/2})\,dx = \left(\frac{3x^2}{2} - 2x^{1/2}\right)\Big|_1^4 = \boxed{20\frac{1}{2}}$

6. 

$= \boxed{8\ 3/4}$

7. $-\sqrt{x^4 - x^2} \cdot 2x$
$= \boxed{-2x\sqrt{x^4 - x^2}}$

B. 1. $\int y'\,dy = \int (2 + x^{-2})\,dx$

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

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

$C = 5$

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

$y(3) = 6 - \frac{1}{3} + 5 = \boxed{10\frac{2}{3}}$

2. $\int_3^8 f'(x)\,dx = f(8) - f(3) = 10$

$f(8) - (-4) = 10$

$\boxed{f(8) = 6}$

C. 1. $\int_1^4 f'(x)\,dx = f(4) - f(1) = 6.2$

$f(4) - 3 = 6.2$

$f(4) = 9.2$

2. a. $\int_{-2}^{1} f'(x)\,dx = f(1) - f(-2)$

$\frac{9}{2} = f(1) - 5$

$f(1) = 19/2$

b. $\int_{-2}^{4} f'(x)\,dx = f(4) - f(-2)$

$\frac{9}{2} - 3 = f(4) - 5$

$f(4) = 6.5$

c. $\int_{-2}^{8} f'(x)\,dx = f(8) - f(-2)$

$\frac{9}{2} - 3 + 2\pi = f(8) - 5$

$f(8) = 6.5 + 2\pi$

3. $2\int_2^5 g(x)\,dx + \int_2^5 3\,dx = 17$

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

$\int_2^5 g(x)\,dx = 4$

4. a. $\int_0^5 f(x)\,dx + \int_0^5 2\,dx = 4 + 10 = 14$

c) = 4 (just shifted)

b. $\int_{-3}^{2} f(x)\,dx + 2 = 4 + 2 = 6$

5. a) $g(1) = \int_1^1 f(t)\,dt = 0$ $g(3) = \int_1^3 f(t)\,dt = -1$

$g(-1) = \int_1^{-1} f(t)\,dt = -\pi$

b) $g' = f$

$f < 0$ on $(1, 3)$ $\therefore$ g is decreasing on $(1, 3)$

c) $g' = f$

f changes from $-$ to $+$ @ $x = 3$ $\therefore$ there is a relative min of $g(x)$ @ $x = 3$

d)

x	$g(x)$
-3	$\int_1^{-3} f(t)\,dt = -2\pi$
1	0
3	-1
4	$\int_1^{4} f(t)\,dt = -\frac{1}{2}$

Absolute max of $g(x)$ occurs @ $x = 1$ and has a value of 0.

e) g'' is the slope of f

the slope of $f > 0$ on $(-3, -1) \cup (2, 4)$

$\therefore$ g is concave up on these intervals

g) $g(-1) = -\pi$

$g'(-1) = f(-1) = 2$

$y + \pi = 2(x+1)$

D.1. $f(6) \approx 100 + 25 \cdot 2 + 23 \cdot 2 + 18 \cdot 2 = 232$

f) g has POIs @ $x = -1, 2$

because g'' is the slope of f and the slope of f changes signs @ $x = -1, 2$

2\. a) $\int_0^{12} T'(x) = T(12) - T(0)$

$= 93 - 105$

$= -12°F$

The temperature dropped 12°F in the first 12 minutes.

b) $\frac{T(11)-T(5)}{11-5} = \frac{94-99}{6} = \frac{-5}{6}$ °F/minute

c) $T'(8) \approx \frac{94-97}{11-5} \approx \frac{-3}{6} = \frac{-1}{2}$ °F/min

d) $\frac{1}{11}\int_0^{11} T(x)\,dx$ is the average temperature in °F during the first 11 minutes.

e) $\frac{1}{11}(105.5 + 99.3 + 97.3)$°F

*3. $\frac{38 \cdot 10 + 29 \cdot 10 + 48 \cdot 10}{30} = \frac{1150}{30} = \frac{115}{3}$

4\. $\frac{10+30}{2} \cdot 3 + \frac{30+40}{2} \cdot 2 + \frac{40+20}{2} \cdot 1 = 160$

E. 1. a) $\frac{1}{4}\int_0^4 x^{\frac{1}{2}}dx$ = $\frac{\frac{2}{3}x^{3/2}\Big|_0^4}{4}$

*

$= \frac{2}{3}\cdot\frac{8}{4} - 0 = \frac{4}{3}$

b) $\sqrt{x} = \frac{4}{3}$

$x = \frac{16}{9}$ $\quad c = \frac{16}{9}$

2. a) $\frac{4\cdot 20 + 4\cdot 50 + 4\cdot 65}{12} = \frac{540}{12} = 45$

b) @ $\approx t = 5$ seconds

3. $\frac{1}{90}\int_0^{90} C(t)dt$ is the average daily cost of heating your house in \$, during the first 90 days.

$\int_0^{90} C(T)dt$ is the total cost of heating your house in \$ for the first 90 days (Jan 1 – March 31, 2010)