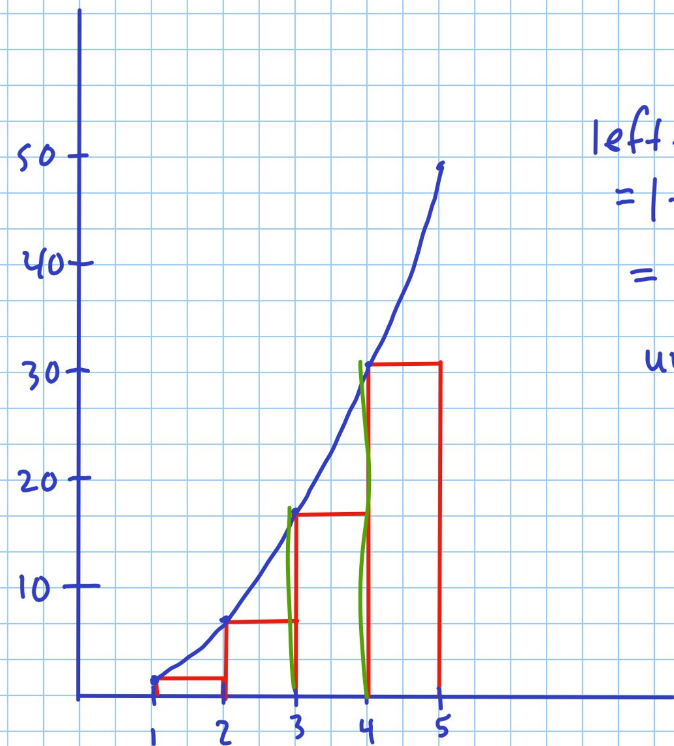
Practice Test Solutions

1) $\int_1^5 (2x^2-1)\,dx$

x	y
1	1
2	7
3	17
4	31
5	49



left-hand sum

$= 1\cdot 1 + 1\cdot 7 + 1\cdot 17 + 1\cdot 31$

$= 56$

underestimate

2) a) $a(t) = -14$

$v(t) = -14t + C$ ← initial velocity

$v(t) = -14t + 28$

$h(t) = \frac{-14t^2}{2} + 28t + C$ ← initial height

$h(t) = -7t^2 + 28t + 35$

b) set $v(t)=0$, then put that t into $h(t)$

$-14t + 28 = 0$

$-14t = -28$

$t = 2$

$h(2) = -7\cdot 2^2 + 28\cdot 2 + 35$

$= 63$ ft

c) set $h(t)=0$, then put that t into $v(t)$.

$-7t^2 + 28t + 35 = 0$

$-7(t^2 - 4t - 5) = 0$

$-7(t-5)(\cancel{t+1}) = 0$

$t = 5$

$v(5) = -14 \cdot 5 + 28$

$= -42 \text{ ft/sec}$

3) a) $\int (x^3 - 8x^2 + 7)\,dx$

$= \frac{x^4}{4} - \frac{8x^3}{3} + 7x + C$ OR $\frac{1}{4}x^4 - \frac{8}{3}x^3 + 7x + C$

b) $\int 6x^{\frac{7}{2}}\,dx$

$= \frac{6x^{9/2}}{9/2} + C$

$= \frac{2}{9} \cdot 6x^{9/2} + C = \frac{12}{9}x^{9/2} + C = \frac{4}{3}x^{9/2} + C$

OR $\frac{4}{3}\sqrt{x^9} + C$

c) $\int_0^2 (x^2+2)(5-x^3)\,dx$ fnInt$((x^2+2)(5-x\text{^}3), X, 0, 2)$

$\int_0^2 (-x^5 - 2x^3 + 5x^2 + 10)\,dx$

$\left(-\frac{x^6}{6} - \frac{x^4}{2} + \frac{5x^3}{3} + 10x\right)\Big|_0^2$

$\left(-\frac{2^6}{6} - \frac{2^4}{2} + \frac{5 \cdot 2^3}{3} + 10 \cdot 2\right) - 0$ ← KEY STEP

$-\frac{64}{6} - \frac{16}{2} + \frac{40}{3} + 20$

$-\frac{32}{3} - \frac{24}{3} + \frac{40}{3} + \frac{60}{3} = \frac{44}{3}$

d) $\int \frac{6-3x+x^2}{2x}\,dx = \int\left(\frac{6}{2x} - \frac{3x}{2x} + \frac{1x^2}{2x}\right)dx$

$= \int\left(\frac{3}{x} - \frac{3}{2} + \frac{1}{2}x\right)dx$

$= 3\ln|x| - \frac{3}{2}x + \frac{1}{2}\cdot\frac{x^2}{2} + C$

$= 3\ln|x| - \frac{3}{2}x + \frac{1}{4}x^2 + C$

e) $\int\left(5\sin x - \frac{7}{x} + 4e^x\right)dx$

$= -5\cos x - 7\ln|x| + 4e^x + C$

f) $\int_1^5 (5-x)\,dx$

$= \left(5x - \frac{x^2}{2}\right)_1^5$

$= \left(5\cdot 5 - \frac{5^2}{2}\right) - \left(5\cdot 1 - \frac{1^2}{2}\right)$

$= 25 - \frac{25}{2} - 5 + \frac{1}{2}$

$= 8$

4) a) $f'(x) = 7 - 2x^2$, $f(-1) = 7$

$f(x) = 7x - \frac{2x^3}{3} + C$

$7(-1) - \frac{2(-1)^3}{3} + C = 7$

$-7 + \frac{2}{3} + C = 7$

$$\frac{2}{3} + C = 14$$

$$C = 13\tfrac{1}{3}$$

$$\boxed{f(x) = 7x - \frac{2x^3}{3} + \frac{40}{3}}$$

b) $f'(x) = 3\cos x \quad f\left(\frac{\pi}{2}\right) = 2$

$$f(x) = 3\sin x + C$$

$$3\sin\frac{\pi}{2} + C = 2$$

$$3 \cdot 1 + C = 2$$

$$C = -1$$

$$f(x) = 3\sin x - 1$$

5) Avg value on $[a,b] = \frac{1}{b-a}\int_a^b f(x)\,dx$

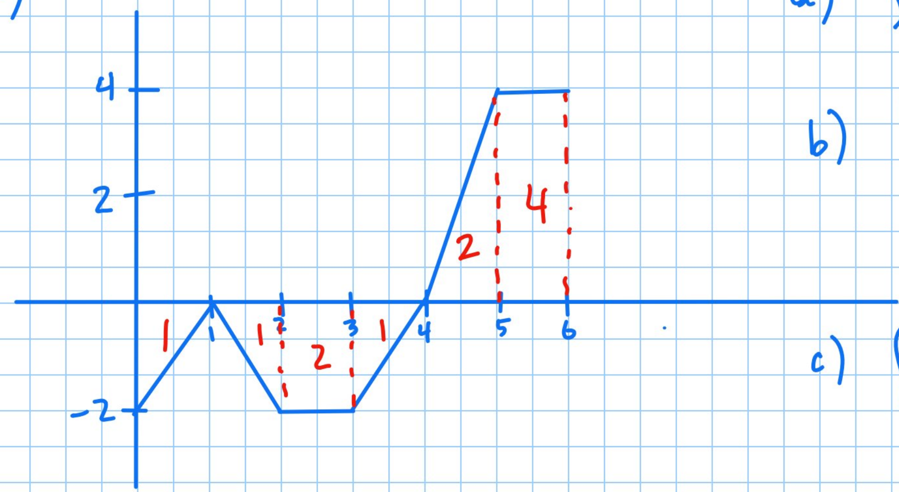
$$\frac{1}{3-(-1)} \underbrace{\int_{-1}^{3} (5x^2 - 6)\,dx}_{\text{fnInt}}$$

$$= \frac{1}{4}\left(22\tfrac{2}{3}\right)$$

$$= \frac{1}{4} \cdot \frac{68}{3}$$

$$= \frac{17}{3}$$

6)



a) $\int_1^3 f(x)\,dx = -3$

b) $\int_3^5 f(x)\,dx = 1$

c) $\int_1^6 f(x)\,dx = 2$

d) $\frac{1}{6-1}\int_1^6 f(x)\,dx$

$= \frac{1}{5} \cdot 2 = \frac{2}{5}$