PPP Solutions

1) $\int_3^9 (x-3)^2\,dx$

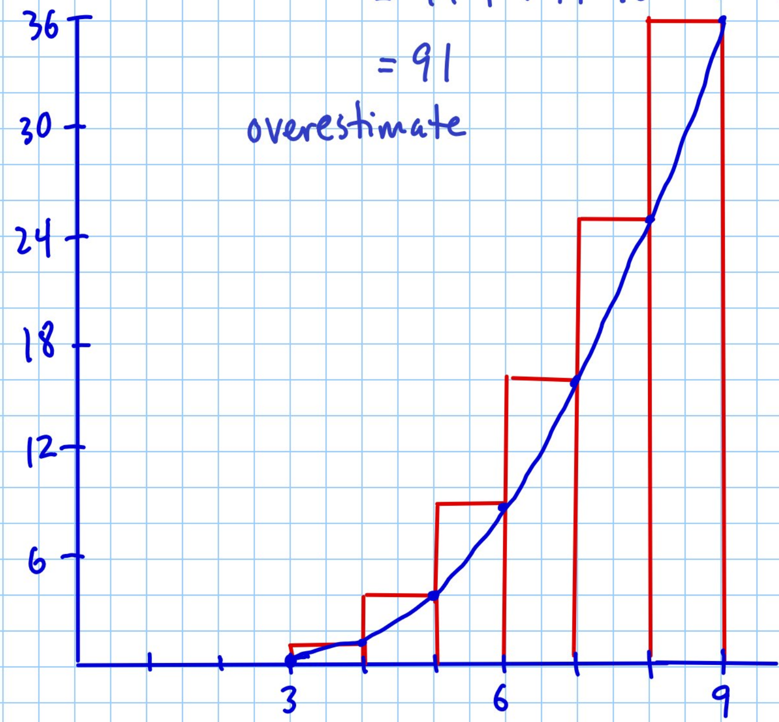
x	y
3	0
4	1
5	4
6	9
7	16
8	25
9	36

Righthand est. $= 1\cdot 1 + 1\cdot 4 + 1\cdot 9 + 1\cdot 16 + 1\cdot 25 + 1\cdot 36$

$= 1 + 4 + 9 + 16 + 25 + 36$

$= 91$

overestimate



2) a) $a(t) = -10$

$v(t) = -10t + C = -10t + 60$

$h(t) = \frac{-10t^2}{2} + 60t + C = -5t^2 + 60t + 140$

b) $v(t) = -10t + 60 = 0$

$-10t = -60$

$t = 6$

$h(6) = -5\cdot 6^2 + 60\cdot 6 + 140 = 320\,ft$ = highest height

c) $h(t) = -5t^2 + 60t + 140 = 0$

$-5(t^2 - 12t - 28) = 0$

$-5(t-14)\cancel{(t+2)} = 0$

$t = 14$ seconds

$v(14) = -10\cdot 14 + 60 = -80\,ft/sec$ = velocity hitting ground

3A) $\int (8+x)(7-3x)\,dx$

$= \int (56 - 17x - 3x^2)\,dx$

$= 56x - \frac{17x^2}{2} - \frac{3x^3}{3} + C$

$= -x^3 - \frac{17x^2}{2} + 56x + C$

3B) $\int \frac{6}{\sqrt[8]{x^3}}\,dx$

$= \int \frac{6}{x^{3/8}}\,dx$

$= \int 6x^{-3/8}\,dx$

$= \frac{6x^{5/8}}{5/8} + C$

$= \frac{8}{5} \cdot 6x^{5/8} + C$

$= \frac{48}{5}\sqrt[8]{x^5} + C$

3C) $\int_{-2}^{3} (5x^2 + 7x - 8)\,dx$

$= \left(\frac{5x^3}{3} + \frac{7x^2}{2} - 8x\right)_{-2}^{3}$

$= \left(\frac{5\cdot 3^3}{3} + \frac{7\cdot 3^2}{2} - 8\cdot 3\right) - \left(\frac{5(-2)^3}{3} + \frac{7(-2)^2}{2} - 8(-2)\right)$

$= \frac{105}{2} - \frac{50}{3}$

$= \frac{215}{6}$

3D) $\displaystyle\int \frac{5x^5 - 8x^4 + 3x^2}{2x^2}\,dx$

$\displaystyle = \int\left(\frac{5x^5}{2x^2} - \frac{8x^4}{2x^2} + \frac{3x^2}{2x^2}\right)dx$

$\displaystyle = \int\left(\frac{5}{2}x^3 - 4x^2 + \frac{3}{2}\right)dx$

$\displaystyle = \frac{5}{2}\cdot\frac{x^4}{4} - \frac{4x^3}{3} + \frac{3}{2}x + C$

$\displaystyle = \frac{5}{8}x^4 - \frac{4}{3}x^3 + \frac{3}{2}x + C$

3E) $\displaystyle\int\left(6e^x - \frac{10}{x} + 5\cos x\right)dx$

$= 6e^x - 10\ln|x| + 5\sin x + C$

3F) $\displaystyle\int_2^3 \frac{8}{x^6}\,dx$

$\displaystyle = \int_2^3 8x^{-6}\,dx$

$\displaystyle = \left(\frac{8x^{-5}}{-5}\right)_2^3$

$\displaystyle = \left(-\frac{8}{5x^5}\right)_2^3$

$\displaystyle = \left(\frac{-8}{5\cdot 3^5}\right) - \left(-\frac{8}{5\cdot 2^5}\right)$

$\displaystyle = \frac{-8}{1215} - \left(-\frac{1}{20}\right)$

$\displaystyle = \frac{211}{4860}$

4A) $f'(x) = \frac{8}{x} + 3$, $f(1) = -3$

$$f(x) = 8\ln|x| + 3x + C$$

$$8\ln 1 + 3\cdot 1 + C = -3$$

$$3 + C = -3$$

$$C = -6$$

$$f(x) = 8\ln|x| + 3x - 6$$

4B) $f'(x) = 6x + 7x^2$, $f(-1) = 5$

$$f(x) = \frac{6x^2}{2} + \frac{7x^3}{3} + C$$

$$= 3x^2 + \frac{7}{3}x^3 + C$$

$$3(-1)^2 + \frac{7}{3}(-1)^3 + C = 5$$

$$3 - \frac{7}{3} + C = 5$$

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

$$C = 4\frac{1}{3}$$

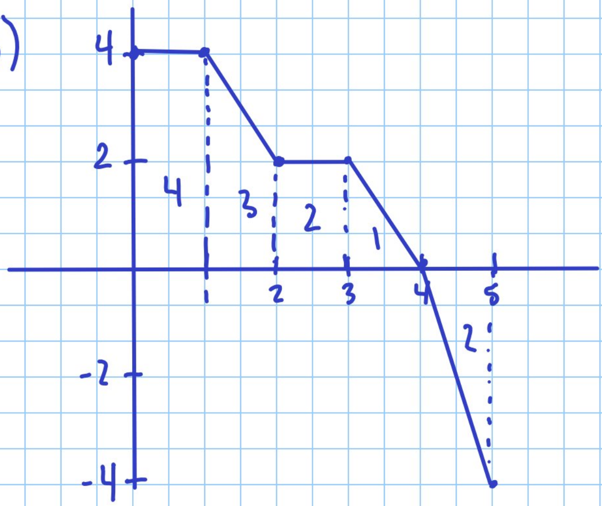
$$f(x) = 3x^2 + \frac{7}{3}x^3 + \frac{13}{3}$$

5) $\frac{1}{5-(-1)} \underbrace{\int_{-1}^{5} (x^2 + 7x)\,dx}_{\text{fn Int}}$

$$= \frac{1}{6} \cdot 126$$

$$= 21$$

6)



A) $\int_0^3 f(x)\,dx = 9$

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

c) $\int_0^5 f(x)\,dx = 8$

D) $\frac{1}{5-0} \cdot 8 = \frac{8}{5}$