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HW 13 MATH 2501 FALL 2018

§5.1 #6 Given: $\sum_{i=1}^{100} a_i = 15$, $\sum_{i=1}^{100} b_i = -12$

Compute: $\sum_{i=1}^{100} 3a_i - 4b_i = \left(3\sum_{i=1}^{100} a_i\right) - \left(4\sum_{i=1}^{100} b_i\right)$

$= 3(15) - 4(-12)$

$= 45 + 48$

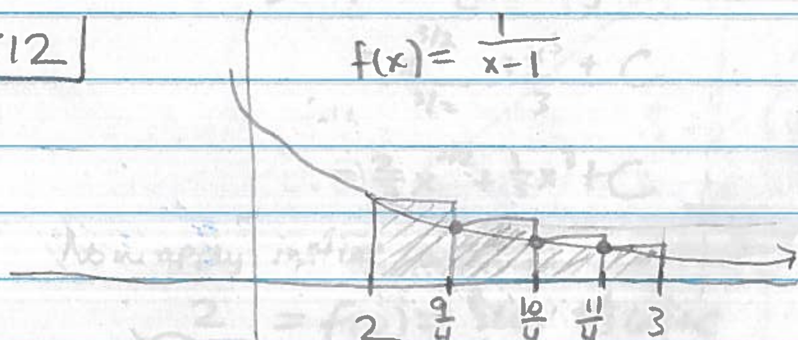
$= 93$

#8 $\sum_{k=1}^{100} 100(k^2 - 5k + 1) = 100\left[\left(\sum_{k=1}^{100} k^2\right) - 5\left(\sum_{k=1}^{100} k\right) + \left(\sum_{k=1}^{100} 1\right)\right]$

$= 100\left[\frac{100(101)(201)}{6} - 5\frac{100(101)}{2} + 100\right]$

$= 31320000$

#12



$\Delta x = \frac{3-2}{4} = \frac{1}{4}$

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

$f(\frac{9}{4}) = \frac{1}{9/4 - 1} = \frac{1}{5/4} = \frac{4}{5}$

$f(10/4) = \frac{1}{10/4 - 1} = \frac{1}{6/4} = 4/6$

$f(11/4) = \frac{1}{11/4 - 1} = \frac{1}{7/4} = 4/7$

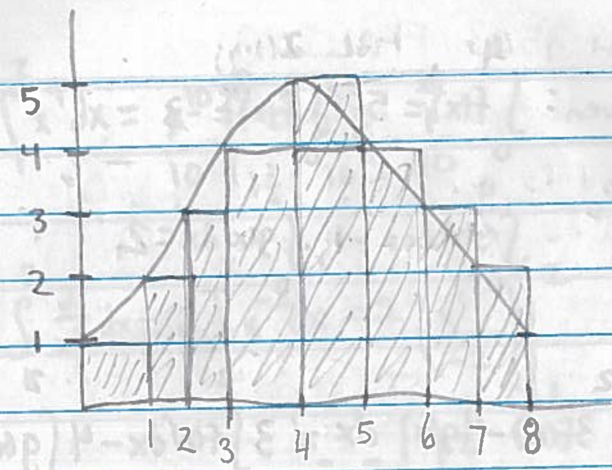
$L_4 = (\frac{1}{4})(1) + (\frac{1}{4})(\frac{4}{5}) + (\frac{1}{4})(\frac{4}{6}) + (\frac{1}{4})(\frac{4}{7})$

$= \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{7}$

$= 319/420$

②

#42

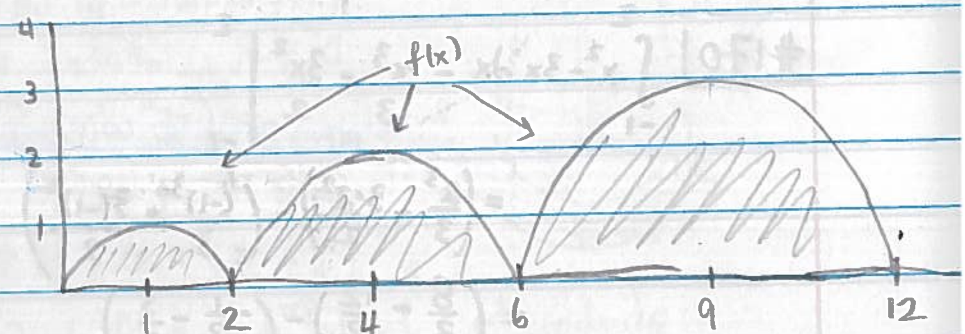


$$\text{Area} = L_8 = (1)(1)+(1)(2)+(1)(3)+(1)(4)+(1)(5)+(1)(6)+(1)(7)+(1)(8)$$
$$= 1+2+3+4+5+6+7+8$$
$$= 36$$

§5.2 **#60** $\displaystyle\lim_{n\to\infty} \sum_{i=1}^{n} (x_i^*)\Delta x = \int_1^3 x\,dx$ over [1,3]

$f(x) = x$

#70



$$\int_0^{12} f(x)\,dx = \int_0^2 f(x)\,dx + \int_2^6 f(x)\,dx + \int_6^{12} f(x)\,dx$$
$$= \tfrac{1}{2}(\pi)(1^2) + \tfrac{1}{2}(\pi)(2^2) + \tfrac{1}{2}(\pi)(3^2)$$
$$= \frac{\pi}{2} + \frac{4\pi}{2} + \frac{9\pi}{2} = \frac{14\pi}{2} = 7\pi$$

#92 Given: $\int_0^4 f(x)\,dx = 5$, $\int_0^2 f(x)\,dx = -3$

$\int_0^4 g(x)\,dx = -1$, $\int_0^2 g(x)\,dx = 2$

Calculate

$$\int_0^2 3f(x) - 4g(x)\,dx = 3\int_0^2 f(x)\,dx - 4\int_0^2 g(x)\,dx$$

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

$$= -9 - 8 = -17$$

#148 $\frac{d}{dx}\int_1^x e^{-t^2}\,dt = e^{-x^2}$

chain rule

#154 $\frac{d}{dx}\int_0^{\sin x} \sqrt{1-t^2}\,dt = \left(\sqrt{1-\sin^2(x)}\right)(\cos(x))$

#170 $\int_{-1}^{2} x^2 - 3x\,dx = \left.\frac{x^3}{3} - \frac{3x^2}{2}\right|_{-1}^{2}$

$$= \left(\frac{2^3}{3} - \frac{3\cdot 2^2}{2}\right) - \left(\frac{(-1)^3}{3} - \frac{3(-1)^2}{2}\right)$$

$$= \left(\frac{8}{3} - \frac{12}{2}\right) - \left(-\frac{1}{3} - \frac{3}{2}\right)$$

$$= \frac{9}{3} - \frac{9}{2} = \frac{18}{6} - \frac{27}{6} = -\frac{9}{6} = -\frac{3}{2}$$

#174 $\int_1^2 x^9 dx = \frac{x^{10}}{10}\Big|_1^2 = \frac{2^{10}}{10} - \frac{1}{10}$

#178 $\int_1^2 \frac{2}{x^3} dx = 2\int_1^2 x^{-3} dx = 2\left(\frac{x^{-2}}{-2}\right)\Big|_1^2$

$= -\frac{1}{x^2}\Big|_1^2$

$= -\frac{1}{4} - \left(-\frac{1}{1}\right) = \frac{3}{4}$

#182 $\int_0^{2\pi} \cos(\theta) d\theta = \sin(\theta)\Big|_0^{2\pi} = \sin(2\pi) - \sin(0) = 0$