

Math 122 HW #5

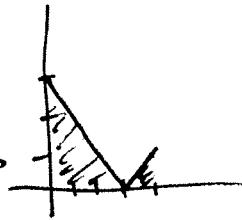
7.3 #16b, 26


7.4 #4, 28, 51


7.3 #16b

$$\int_0^4 f(x) dx$$

this area



3  has area $\frac{1}{2} \cdot 3 \cdot 3 = \frac{9}{2}$

 has area $\frac{1}{2} \cdot 1 \cdot 1 = \frac{1}{2}$

Total area = $\frac{9}{2} + \frac{1}{2} = \frac{10}{2} = \textcircled{5}$

7.3 #26 (left endpt)
 $\Delta x = 1$ is given

we want to estimate $\int_0^{20} f(x) dx$

so it's $\approx f(0) + f(1) + \dots + f(19)$

= $0 + 2.25 + 3 + 3.5 + 3.5 + 3.6 + 3.6 + 3.6 + 3.6 + 3.6 + 3.6$

$+ 1.25 + .75 + \dots + .6 + .5 + .4 + .3 + .25 + .2 + .1$
 ↑
 guess these from the picture

= ~~35~~ 38.2

7.4 #4

$$\begin{aligned}\int_{-2}^2 4z+3 \, dz &= 2z^2+3z \Big|_{-2}^2 \\ &= 2 \cdot 2^2 + 3 \cdot 2 - (2 \cdot (-2)^2 + 3(-2)) \\ &= 8+6 - (8-6) \\ &= 12\end{aligned}$$

7.4 #28

$$\int_1^2 \frac{3}{x(1+\ln x)} \, dx \quad \begin{array}{l} u = 1+\ln x \\ du = \frac{1}{x} \, dx \end{array}$$

$$\begin{aligned}&= 3 \int_1^2 \frac{1}{1+\ln x} \cdot \frac{1}{x} \, dx = 3 \int_{x=1}^{x=2} \frac{1}{u} \, du \\ &= 3 \ln u \Big|_{x=1}^{x=2} = 3 \ln(1+\ln x) \Big|_1^2 \\ &= 3 \ln(1+\ln 2) - 3 \ln(1+\ln 1) \\ &= 3 \ln(1+\ln 2) \quad (\ln 1 = 0) \\ &= 1.579 \dots\end{aligned}$$

7.4 #51

$$\int_{-1}^4 f(x) \, dx, \quad f(x) = \begin{cases} 2x+3 & x \leq 0 \\ -\frac{x}{4}-3 & x > 0 \end{cases}$$

$$\begin{aligned}\hookrightarrow &= \int_{-1}^0 2x+3 \, dx + \int_0^4 -\frac{x}{4}-3 \, dx \\ &= (x^2+3x) \Big|_{-1}^0 + \left(-\frac{x^2}{8}-3x\right) \Big|_0^4 \\ &= 0^2+3 \cdot 0 - ((-1)^2+3(-1)) + \left(-\frac{4^2}{8}-3 \cdot 4\right) - \left(-\frac{0^2}{8}-3 \cdot 0\right) \\ &= -(1-3) + \left(-\frac{2}{1}-12\right) \\ &= 2 + (-14) = -12\end{aligned}$$