

Weekly HW #5

3.9 # 34, 35, 4.1 # 13, 4.2 # 2, 36, 40, 50

34. $f''(x) = 8x^3 + 5$ with $f(1) = 0, f'(1) = 8$.

$\Rightarrow f'(x) = 2x^4 + 5x + C$

$\Rightarrow f'(1) = 2(1)^4 + 5(1) + C = 8$

$\Rightarrow \boxed{C = 1}$

$f'(x) = 2x^4 + 5x + 1$

$\Rightarrow f(x) = \frac{2}{5}x^5 + \frac{5}{2}x^2 + x + d$

$f(1) = \frac{2}{5}(1)^5 + \frac{5}{2}(1)^2 + 1 + d = 0$

$\boxed{f(x) = \frac{2}{5}x^5 + \frac{5}{2}x^2 + x - \frac{39}{10}}$

$\frac{4}{10} + \frac{25}{10} + \frac{10}{10} + d = 0$

$\frac{39}{10} + d = 0$

$\Rightarrow \boxed{d = -\frac{39}{10}}$

35. $f''(\theta) = \sin\theta + \cos\theta, f(0) = 3, f'(0) = 4$

$f'(\theta) = -\cos\theta + \sin\theta + C$

$f'(0) = -\cos 0 + \sin 0 + C = 4$

$-1 + 0 + C = 4 \Rightarrow \boxed{C = 5}$

$f'(\theta) = -\cos\theta + \sin\theta + 5$

$f(\theta) = -\sin\theta - \cos\theta + 5\theta + d$

$f(0) = 0 - 1 + 0 + d = 3$

$\Rightarrow \boxed{d = 4}$

$\boxed{f(\theta) = -\sin\theta - \cos\theta + 5\theta + 4}$

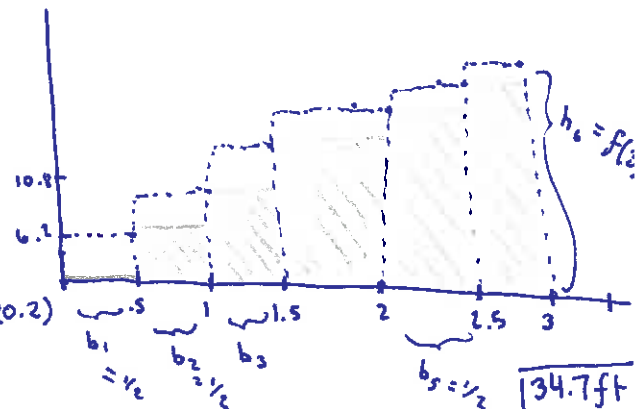
13. Speed of runner.

* since she is speeding up (velocity is increasing) over the entire interval, right endpoints will be overestimates.

UPPER ESTIMATE: (right endpt R. sum).

Total distance =

$\frac{1}{2}(6.2) + \frac{1}{2}(10.8) + \frac{1}{2}(14.9) + \frac{1}{2}(18.1) + \frac{1}{2}(19.4) + \frac{1}{2}(20.2)$



$= \boxed{44.8 \text{ ft.}}$

LOWER EST: (left endpt)

dist = $\frac{1}{2}(0 + 6.2 + 10.8 + 14.9 + 18.1 + 19.4) =$

{ speed 6.2 ft/sec for 1/2 sec \Rightarrow 3.1 ft traveled }

$\boxed{34.7 \text{ ft}}$

2. IF $f(x) = x^2 - 2x$, $0 \leq x \leq 3$, evaluate the Riemann sum with $n=6$, sampling right endpoints. What does the R. sum represent?

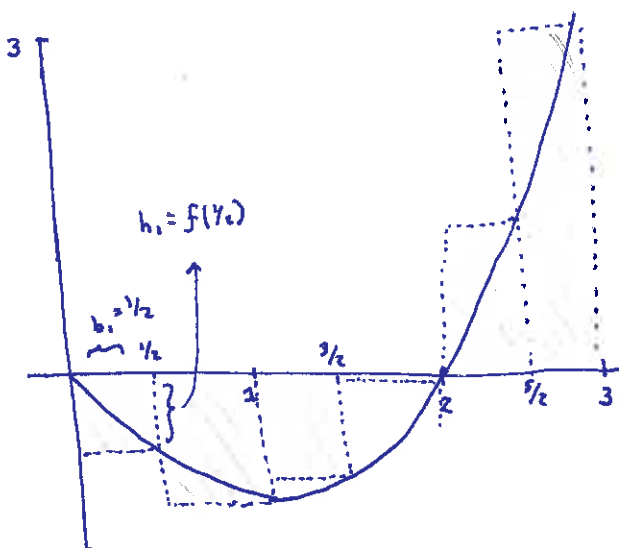
heights: $f(0.5) = -3/4$, $f(1) = -1$, $f(1.5) = -0.75$
 $f(2.0) = 0$, $f(2.5) = 1.25$, $f(3) = 3$

bases: $b_1 = b_2 = b_3 = b_4 = b_5 = b_6 = .5$

$$\frac{1}{2} (-0.75 + -1 + -0.75 + 0 + 1.25 + 3)$$

$$= \boxed{0.875}$$

An estimation of $\int_0^3 x^2 - 2x dx$



$$f(x) = \begin{cases} 3 & \text{for } x \leq 3 \\ x & \text{for } x \geq 3 \end{cases}$$

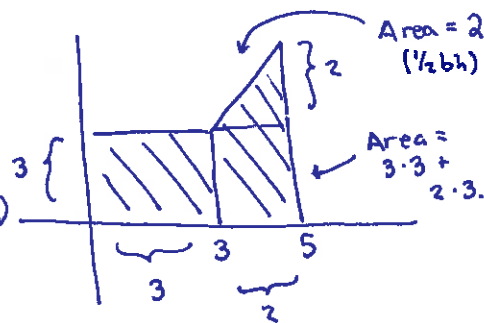
#50

50. $\int_0^5 f(x) dx$

$$= \text{Area}_{\square} + \text{Area}_{\triangle}$$

$$= 3(3) + 2(3) + \frac{1}{2}(2)(2)$$

$$= 17.$$

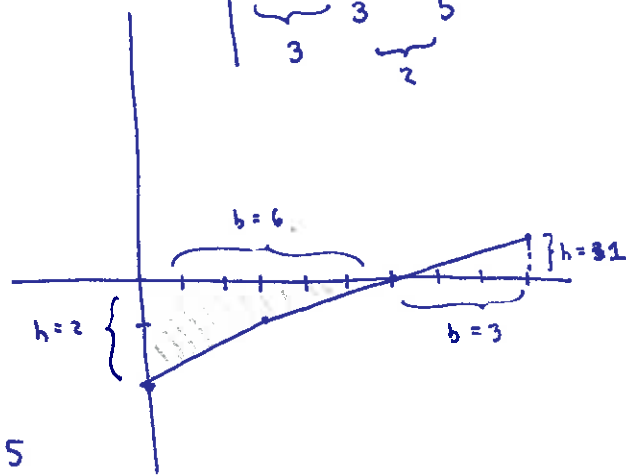


36. $\int_0^9 (\frac{1}{3}x - 2) dx$

$\text{Area}_{\triangle} = \frac{1}{2}bh = \frac{1}{2}(6)(2) = 6$ } BELOW X-AXIS \Rightarrow NEGATIVE.

$\text{Area}_{\triangle} = \frac{1}{2}(3)(1) = 3/2$

$$\int_0^9 (\frac{1}{3}x - 2) dx = -6 + 3/2 = \boxed{-9/2} = -4.5$$



40. $\int_0^{10} |x - 5| dx$

$\text{Area}_{\triangle} = \frac{1}{2}bh_1 = \frac{1}{2}(5)(5) = \frac{25}{2}$

$\text{Area}_{\triangle} = \frac{1}{2}bh_2 = \frac{1}{2}(5)(5) = \frac{25}{2}$

$$\int_0^{10} |x - 5| dx = \frac{25}{2} + \frac{25}{2} = 25.$$

