

Midterm 1 Review Solutions

5.1

1. (a) 3 rectangles: 8
6 rectangles: 6.875
- (b) 3 rectangles: 5
6 rectangles: 5.375
- (c) 3 rectangles: 5.75
6 rectangles: 5.9375
- (d) Midpoint

2. Lower: 34.7 ft
Upper: 44.8 ft

$$3. (a) \lim_{n \rightarrow \infty} \left(\frac{2(1+\frac{2}{n})}{(1+\frac{2}{n})^2+1} \left(\frac{2}{n}\right) + \frac{2(1+\frac{4}{n})}{(1+\frac{4}{n})^2+1} \left(\frac{2}{n}\right) + \frac{2(1+\frac{6}{n})}{(1+\frac{6}{n})^2+1} \left(\frac{2}{n}\right) + \dots + \frac{2(1+\frac{2n}{n})}{(1+\frac{2n}{n})^2+1} \left(\frac{2}{n}\right) \right)$$

$$= \lim_{n \rightarrow \infty} \sum_{i=1}^n \left(\frac{2(1+\frac{2i}{n})}{(1+\frac{2i}{n})^2+1} \left(\frac{2}{n}\right) \right)$$

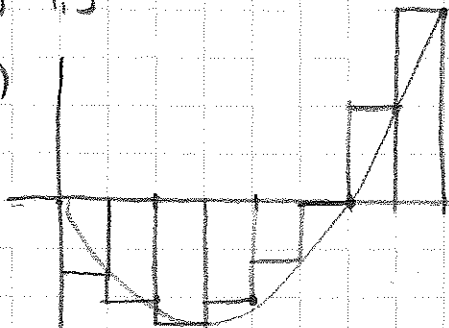
$$(b) \lim_{n \rightarrow \infty} \left(\sqrt{\sin \frac{\pi}{n}} \left(\frac{\pi}{n}\right) + \sqrt{\sin \frac{2\pi}{n}} \left(\frac{\pi}{n}\right) + \sqrt{\sin \frac{3\pi}{n}} \left(\frac{\pi}{n}\right) + \dots + \sqrt{\sin \frac{n\pi}{n}} \left(\frac{\pi}{n}\right) \right)$$

$$= \lim_{n \rightarrow \infty} \sum_{i=1}^n \left[\sqrt{\sin \frac{i\pi}{n}} \left(\frac{\pi}{n}\right) \right]$$

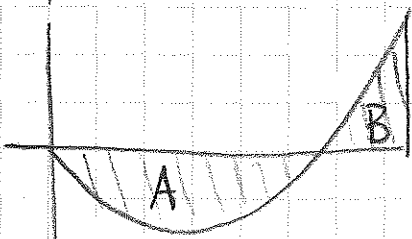
5.2

1. (a) -1.5

(b)



(c)



$$\int_0^4 (x^2 - 3x) dx = B - A$$

2. (a) 1.5

(b) $3 + (9/4)\pi$

(c) 2.5

3. $\int_{-1}^5 f(x) dx$

4. (a) $12 + 4\pi$

(b) $\frac{8}{3} + 10\pi$

5.3

1. Suppose f is continuous on $[a, b]$

(I) If $g(x) = \int_a^x f(t) dt$, then $g'(x) = f(x)$

(II) $\int_a^b f(x) dx = F(b) - F(a)$, where $F' = f$

2. (a) $1/(x^3+1)$

(b) $(s-s^2)^8$

(c) $-\sqrt{1+\sec x}$

(d) $-\cos\sqrt{x}$

3. $-4 < x < 0$

5.4

1. (a) $x^5/5 - x^4/8 + x^2/8 - 2x + C$

(b) $2u^3/3 + 9u^2/2 + 4u + C$

(c) $\theta^2/2 + \csc \theta + C$

4. (a) 21

(b) 27

2. (a) $\ln 2 + 7$

(b) $1/(e+1) + e - 1$

(c) 0

5. (a) $v(t) = t^2/2 + 4t + 5$

(b) $s(t) = t^3/6 + 2t^2 + 5t + 3$

(c) 37.5

3. (a) $-10/3$

(b) -2

(c) $3/4 - 2 \cdot \ln(2)$

(d) $9/(\ln 10) + 1/11$

(e) $1/2$

5.5

1. (a) Yes sub; $e^{7x}/7 + C$

(b) No sub; $2x^4 + x^3 + C$

(c) Yes sub; $2 \sin(x/2) + C$

(d) Yes sub; $(e^{x^2})/2 + C$

(e) Either; $(y^2+1)^3/6 + C$

(f) Yes sub; $1/3$

(g) Yes sub; $1/2$

(h) No sub; $8/3 - 2 \ln 3$

(i) Yes sub; $-\ln(5)/2 + \ln(2)/2$

(j) Yes sub; $15/128$

(k) No sub; 21

(l) Yes sub; $\ln((e^2+1)/2)$

(m) Yes sub; 0

(n) Yes sub; $1/11$