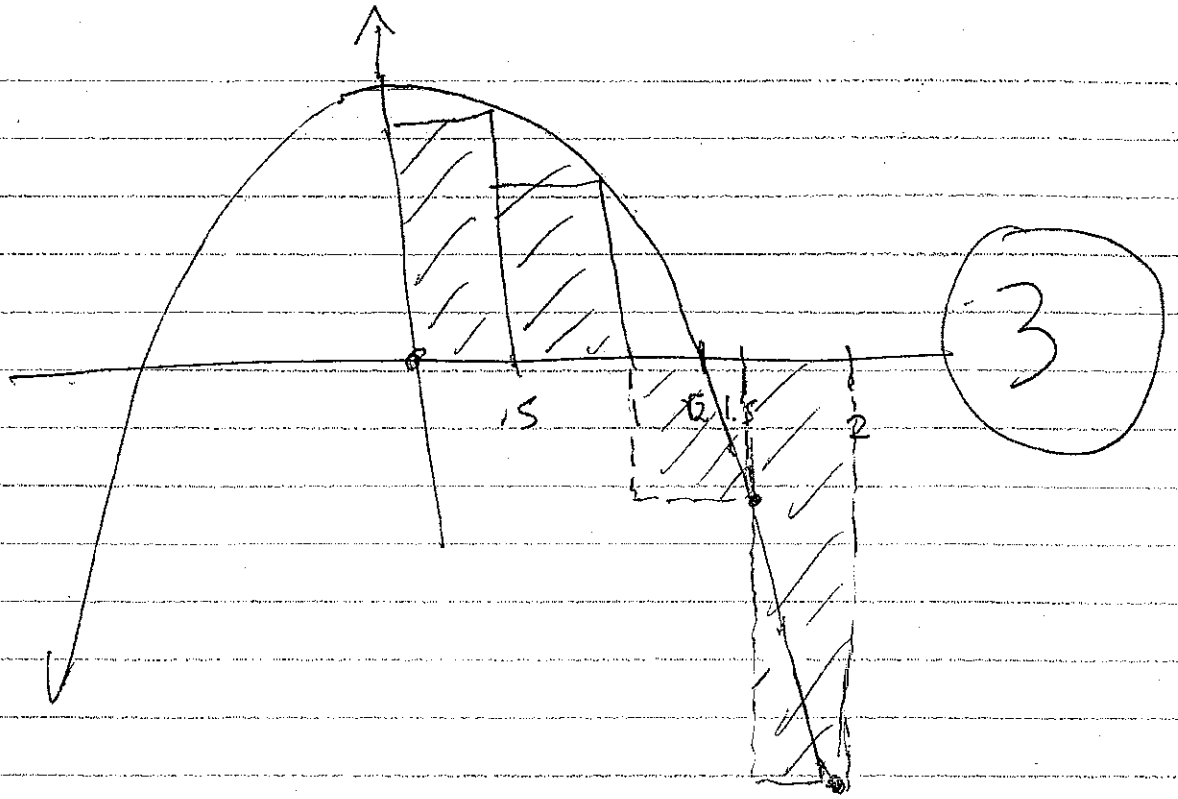
solutions #9

5.2

1. 6pt.



3

$$\sum_{i=0}^{3} f(x_i^*)\Delta x = \frac{1}{2}\left[f(.5) + f(1) + f(1.5) + f(2)\right]$$

3 $= \frac{1}{2}\left[1.75 + 1 - (.25) - 2\right]$

$= .25$

17. 2pt.

$$\lim_{n\to\infty} \sum_{i=1}^{n} x_i \sin x_i \Delta x = \int_0^{\pi} x \sin x \, dx$$ 2

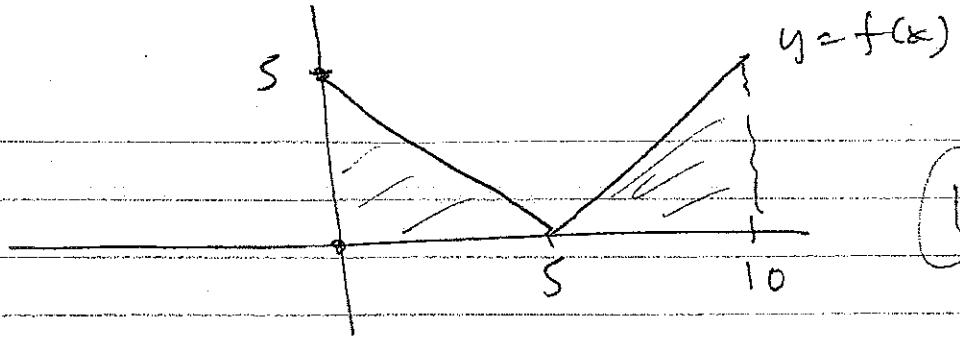
29. 3pt.

$$\int_2^6 \frac{x}{1+x^5}\,dx = \lim_{n\to\infty} \sum_{i=1}^{n} \left(\frac{x_i^*}{1+x_i^{*5}}\right)\Delta x$$ 2

$\left(\Delta x = \frac{6-2}{n} = \frac{4}{n}\right)$ 1

40.

3pt.



(1)

$$\therefore \int_0^{10} f(x)\,dx = \frac{5\cdot 5}{2} + \frac{5\cdot 5}{2} = 25$$

(2)

5.3

24. 4pt.

$$\int_1^8 x^{1/3}\,dx = \frac{3}{4}x^{4/3}\Big|_1^8 = \frac{3}{4}\left[2^4 - 1\right]$$

(2) (2)

$$= 12 - \frac{3}{4}$$

$$= \frac{45}{4}$$

32. 4pt.

$$\int_0^1 (3 + x\sqrt{x})\,dx = 3x + \frac{2}{5}x^{5/2}\Big|_0^1$$

(2)

$$= 3 + \frac{2}{5}$$

$$= \frac{17}{5}$$ (2)

34. 4pt.

$$\int_0^{\pi/6} \frac{1}{\sin\theta}\cdot\frac{\cos\theta}{\sin\theta}\,d\theta = \int_0^{1/2} \frac{du}{u^2} = -\frac{1}{u}\Big|_0^{1/2} = -\frac{1}{\frac{1}{2}} + \frac{1}{0}$$ (DNE)

$\begin{cases} u = \sin\theta \\ du = \cos\theta\,d\theta \end{cases}$

(2) (2)

5.5

28. $\int e^{\cos t} \sin t \, dt = -\int e^{u} \, du = -e^{u} + C$ (1) (2)

Spt.

$\begin{cases} u = \cos t \\ du = -\sin t \, dt \end{cases}$ (1)

$= -e^{\cos t} + C$ (1) (do not deduct for omitting constant C)

32. $\int \frac{e^x}{e^x + 1} \, dx = \int \frac{du}{u} = \log|u| + C$ (1) (2)

Spt.

$\begin{cases} u = e^x + 1 \\ du = e^x \, dx \end{cases}$ (1)

$= \log(e^x + 1) + C$ (1)

36. $\int \frac{\sin x}{1 + \cos^2 x} \, dx = -\int \frac{1}{1 + u^2} \, du = -\arctan u + C$ (1) (2)

Spt.

$\begin{cases} u = \cos x \\ du = -\sin x \, dx \end{cases}$ (1)

$= -\arctan(\cos x) + C$ (1)