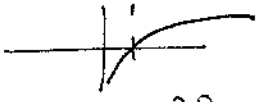
Assignment # 24

4/13/2001

24.1

#21 graph of $\ln x = y$:



so, $\int_{0.5}^{2} \ln x\,dx < \int_{1}^{2} \ln x\,dx < \int_{1}^{2.5} \ln x\,dx$

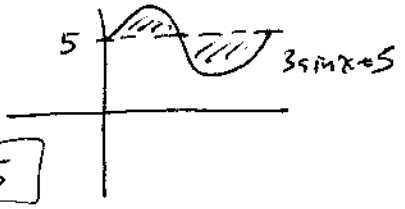
#23 a)iii) $\int \ln x\,dx = x\ln x - x$

b) $\int_1^6 \ln x\,dx = x\ln x - x \Big|_1^6 = 6\ln 6 - 6 - (\ln 1 - 1)$

$= 6\ln 6 - 6 + 1 = \boxed{6\ln 6 - 5}$

24.2

#1 geometrically:



average value = $\boxed{5}$

$$\frac{\int_0^{2\pi} 3\sin x + 5}{2\pi} = \frac{-3\cos x + 5x \Big|_0^{2\pi}}{2\pi}$$

$$= \frac{-3\cos(2\pi) + 5(2\pi) - \left[-3\cos 0 + 5(0)\right]}{2\pi}$$

$$= \frac{-3 + 10\pi + 3}{2\pi} = \frac{10\pi}{2\pi} = \boxed{5}$$

#5 a) his velocity eastward @ 5 pm.

b) how far he is from his starting point @ 5 pm.

c) his total distance traveled (in any direction) by 5 pm

d) his speed (in any direction) at 5 pm

e) his acceleration eastward at 5 pm

f) his average velocity eastward between noon and 5 pm

(#7) a) $|3\sin(\pi t)|$

b) $\int_0^2 3\sin(\pi t)\,dt = 0$

c) $\int_0^2 |3\sin(\pi t)|\,dt \approx 3.8$ (twice the area of each "bump")

d) $\dfrac{\int_0^2 3\sin(\pi t)\,dt}{2} = 0$

e) $\dfrac{\int_0^2 |3\sin(\pi t)|\,dt}{2} \approx 1.9$

(#8) $\text{III} < \text{I} = \text{IV} < \text{II}$

(#10) to find average velocity : $\dfrac{\text{total distance traveled}}{\text{total time}}$

$$\text{avg. velocity} = \frac{2 \text{ miles}}{8\text{min} + 2\text{min}} = \frac{2 \text{ miles}}{\frac{1}{6}\text{hr}} = \boxed{12 \frac{\text{miles}}{\text{hour}}}$$

25.1

(#2) $\int At^n dt = A \cdot \frac{1}{n+1} t^{n+1}$

(#3) $\int 3x^{-1} dx = 3\int \frac{1}{x} dx = 3\ln x$

(#6) $\int \frac{5\,dx}{7x} = \frac{5}{7}\int \frac{dx}{x} = \frac{5}{7}\ln x$

(#9) $\int \frac{e^p}{2} dp = \frac{1}{2}\int e^p dp = \frac{1}{2}e^p$