

WORKSHEET FOR 1/26/2009

Reading assignment for Wednesday. Read section 6.1 (new stuff!) for lab on Wednesday. Review section 5.7 for class.

Homework due Wednesday:

- 5.4: 50, 53
- 5.6: 17, 25, 26
- 5.7: 1, 2, 5 (in 1 & 2, you do not need to evaluate the sum)

(1) Evaluate the following using integration by substitution, and check your answer by differentiating.

(a) $\int \sqrt{3x - 2} dx$

(b) $\int_2^1 x\sqrt{3x - 2} dx$ (Hint: solve for x in terms of u .)

(c) $\int \frac{x^2}{1 + x^6} dx$.

(2) Consider $\int_{-1}^3 x^2 dx$ (*).

(a) Evaluate (*) exactly, using the fundamental theorem of calculus.

(b) Approximate (*) by computing L_4 . That is, divide the interval $[-1, 3]$ into four equal subintervals, and write down the corresponding Riemann sum, sampling at

the left endpoints of the interval. You should end up with the sum $\sum_{i=0}^3 f(x_i)\Delta x_i$,

where $f(x) = x^2$, $\Delta x_i = \frac{3 - (-1)}{4} = 1$, and $x_i = -1 + i$.

(c) Compute R_4 . That is, approximate the integral in the same way as in part (b), but this time use the *right* endpoint of each interval rather than the left.

(d) Compute M_4 . Same thing, but using the midpoint of each interval.

(e) Compute T_4 . This is just the average of R_4 and L_4 . Geometrically, we are using trapezoids instead of rectangles to approximate the area. Which approximation(s) give the best result?

(f) Write down an expression for the approximation R_n to (*). Using this, express (*) as a limit of Riemann sums.

(3) Write down the following sums in Σ -notation:

(a) $1^2 + 3^2 + 5^2 + \dots + 97^2 + 99^2$

(b) $2^1 + 2^2 \cdot 2^2 + 2^3 \cdot 3^3 + 2^4 \cdot 4^4 + \dots + 2^{14} \cdot 14^{14} + 2^{15} \cdot 15^{15}$

(4) Evaluate: $\sum_{k=1}^4 \sqrt{k}$