

Honors Calculus, Math 1450- HW 5 (due Tuesday 18th October)

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All section references are to Stewart 6th edition. Show all working and write your answers neatly. Staple your work.

(1) Show by induction that

(i) $\sum_{j=1}^n j = \frac{n(n+1)}{2}$

(ii) $\sum_{j=1}^n j^2 = \frac{n(n+1)(2n+1)}{6}$

(2) Use the results of (1) to show that $\int_0^a x \, dx = \frac{a^2}{2}$ and $\int_0^a x^2 \, dx = \frac{a^3}{3}$ by using Riemann sums consisting of partitions of $[0, a]$ into n equal subintervals of length $\frac{a}{n}$ and taking the limit as n goes to infinity. *Hint: Take the right endpoint as x_i^* .*

(3) Section 5.2: 52, 53, 54

(4) Section 5.3: 24, 30, 36, 38, 40, 42, 54, 56, 60, 66, 70

(5) In the following indefinite integrals you may need to use method of substitution or integration by parts (or both).

(i)

$$\int e^x \sin(e^x) dx$$

(ii)

$$\int \frac{\log x}{x} dx$$

(iii)

$$\int \frac{x}{\sqrt{1-x^4}} dx$$

(iv)

$$\int x^2 \sin(x) dx$$

(v)

$$\int x\sqrt{1-x^2} dx$$

(vi)

$$\int (\log x)^2 dx$$

(vii)

$$\int \frac{1}{x \log x} dx$$

(6) Section 6.1: 10, 12, 18, 26, 50 (a) (not (b)).