Honors Calculus, Math 1450- HW 5 (due Thursday 22nd 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, 54

(4) Section 5.3: 24, 28, 36, 40, 54, 56, 66, 68, 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)
$$\int \sqrt{x}\log(x)\ dx$$

(viii)
$$\int \frac{1}{x\log x}\ dx$$

(6) Section 7.1: 18, 28, 32, 36, 48