CALCULUS I

AUTUMN 2015 - HOMEWORK 3

1. Write the below sums without the sigma notation and then evaluate them.

$$\text{a) } \sum_{k=1}^{2} \frac{6k}{k+1} \quad \text{b) } \sum_{k=1}^{3} \frac{k-1}{k} \quad \text{c) } \sum_{k=1}^{4} \cos(k\pi) \quad \text{d) } \sum_{k=1}^{5} \sin(k\pi)$$

2. For the below exercises, graph the integrand and use areas to evaluate the integrals.

$$\text{a) } \int_{-2}^{4} \left(\frac{x}{2}+3\right) dx \quad \text{b) } \int_{-4}^{0} \sqrt{16-x^2}dx \quad \text{c) } \int_{-2}^{1} |x|\, dx$$

3. Evaluate the below integrals.

$$\text{a) } \int_{0}^{2} x(x-3)\, dx \quad \text{b) } \int_{-1}^{1} \left(x^2-2x+3\right) dx \quad \text{c) } \int_{0}^{1} \left(x^2+\sqrt{x}\right) dx$$

$$\text{d) } \int_{0}^{\pi/3} 2\sec^2 x dx \quad \text{e) } \int_{0}^{\pi} (1+\cos x)\, dx \quad \text{f) } \int_{\pi/4}^{3\pi/4} \csc\theta \cot\theta d\theta$$

$$\text{g) } \int_{\pi/2}^{0} \frac{1+\cos 2t}{2} dt \quad \text{h) } \int_{0}^{\pi/8} \sin(2x)\, dx \quad \text{i) } \int_{-\sqrt{3}}^{\sqrt{3}} (t+1)\left(t^2+4\right) dt$$

$$\text{j) } \int_{\sqrt{2}}^{1} \left(\frac{u^7}{2}-\frac{1}{u^5}\right) du \quad \text{k) } \int_{\pi/2}^{\pi} \frac{\sin 2x}{2\sin x} dx \quad \text{l) } \int_{-4}^{4} |x|\, dx$$

4. Find the total area between the region and the $x-$axis.

$$\text{a) } y=-x^2-2x,\ -3\le x\le 2 \quad \text{b) } y=3x^2-3,\ -2\le x\le 2$$

5. Evaluate the indefinite integrals in the below exercises by using the given substitutions to reduce the integrals to standard form.

$$\text{a) } \int 7\sqrt{7x-1}dx\ ,\ u=7x-1 \quad \text{b) } \int \frac{4z^3}{\left(z^4+1\right)^2} dz\ ,\ u=z^4+1$$

$$\text{c) } \int \sec 2t \tan 2t\ dt\ ,\ u=2t \quad \text{d) } \int \frac{1}{x^2}\cos^2\left(\frac{1}{x}\right) dx\ ,\ u=-\frac{1}{x}$$

6. Evaluate the below integrals.

$$\text{a) } \int \tan^2 x \sec^2 x\ dx \quad \text{b) } \int \frac{\sin(2t+1)}{\cos^2(2t+1)} dt$$

$$\text{c) } \int t^3\left(1+t^4\right)^3 dt \quad \text{d) } \int 3x^5\sqrt{x^3+1}dx$$