Math 152

Winter 2004

Review 1

(1.) Solve the given differential equation for the given conditions on x and y:

(a.) $\frac{dy}{dx} = x^{-3} + 2$ where $y = 3$ at $x = 1$.

(b.) $\frac{dy}{dx} = \sin x$ where $y = 2$ at $x = 0$.

(b.) $\frac{dy}{dt} = t^2 y^4$ where $y = 2$ at $t = 1$.

(2.) Evaluate $\lim_{n\to\infty} \sum_{i=1}^{n} \left(\frac{i}{n}\right)^7 \frac{1}{n}$ by finding and evaluating a definite integral which is equal to this limit.

(3.) Form a Riemann sum which approximates $\int_0^2 (x+1)\,dx$ by partitioning the interval $[0, 2]$ into n equal parts and picking an appropriate sample point $\overline{x}_i$. (Hint: take $\overline{x}_i = \frac{2i}{n}$). DO NOT EVALUATE.

(4.) Find $G'(x)$ where:

(a.) $G(x) = \int_0^x (2t^2 + \sqrt{t})\,dt$

(b.) $G(x) = \int_x^1 3t\,dt$

(c.) $G(x) = \int_1^{x^2+x} \frac{1}{t^2+1}\,dt$

(d.) $G(x) = \int_x^{x^3} \frac{1}{t^2+1}\,dt$

(5.) Evaluate the given integral:

(a.) $\int \frac{2x^4 - 3x^2 + 1}{x^2}\,dx$

(b.) $\int y\sqrt{y^2 - 4}\,dy$

(c.) $\int \frac{y^2 + y + 1}{\sqrt[5]{2y^3 + 3y^2 + 6y}}\,dy$

(d.) $\int (x+1)\tan^2(3x^2+6x)\sec^2(3x^2+6x)\,dx$

(e.) $\int_0^{\pi/2} \cos^4 x \sin x\,dx$

(f.) $\int_0^2 \frac{t^3}{\sqrt{t^4+9}}\,dt$

(6.) Find the area of the region between the given curves:

(a.) $y = \sqrt{x} - 10$ and $y = 0$ with $0 \le x \le 9$.

(b.) $y = x^2 - 9$ and $y = (2x-1)(x+3)$.