Prince Sultan University, Department of Mathematics, 03/05/2011.
Calculus II (Math 113), Mid-Term 2- Fall (102).
Dr Abdelouahed HAMDI Duration : 90 min

**1.** (20 pts) Determine $\dfrac{dy}{dx}$

(a) $y = \dfrac{(2x^2+1)^{2011}4^{2x}\cos^2(3+x)}{\sqrt[3]{4+x^4}}$

(b) $y = \log_{x^2+1}(2011)$

(c) $y = [\tan(2x)+4]^{x^3+2x}$

(d) $y = \sec^{-1}(x^3-2x)$

(e) $y = \tan^{-1}(\sqrt{x}\ )$.

**2.** (35 pts) Evaluate

(a) $\displaystyle\int \frac{2x}{\sqrt{16-x^4}}dx$

(b) $\displaystyle\int 5x\ e^{3x^2+1}dx$

(c) $\displaystyle\int 10^{-2x}dx$

(d) $\displaystyle\int \frac{1}{x\sqrt{x-1}}dx$

(e) $\displaystyle\int \frac{\ln(x)}{x\,[\ln(x)+3]}dx$

(f) $\displaystyle\int \frac{x^2}{x+1}dx$

(g) $\displaystyle\int (x-2)\sqrt{x+1}dx$

**3.** (10 pts) Evaluate the exact arc length of the curve $y = (x-4)^{3/2}$ over $[4, 7]$.

**4.** (15 pts) Setup the integral to find the total area of the region between the $x$-axis and the graph of $y = 3x - x^2$ over the interval $[-1,\ 3]$.

**5.** (20 pts) Setup the integral giving the volume of the solid generated by revolving the region bounded by $y = 0,\ \ y = \sqrt{x+1},\ \ x = 3$ about
(a) the line $x = -4$,
(b) the line $y = -2$.

**6.** (Bonus question 3pts) Evaluate $\int (x^6+x^3)\sqrt[3]{x^3+2}\ dx$.