Math 101 – WORKSHEET 4
THE FUNDAMENTAL THEOREM OF CALCULUS

(1) (Differentiating integrals) Evaluate

    (a) $\frac{\mathrm{d}}{\mathrm{d}x} \int_0^x e^{t^2}\,\mathrm{d}t$

    (b) $\frac{\mathrm{d}}{\mathrm{d}x} \int_x^1 e^{t^2}\,\mathrm{d}t$

    (c) (Final 2009) $\frac{\mathrm{d}}{\mathrm{d}x} \int_{x^2}^{e^x} \sqrt{\cos t}\,\mathrm{d}t$

    (d) (Final 2014) Let $f(x) = \int_1^x 100(t^2 - 3t + 2)e^{-t^2}\,\mathrm{d}t$. Find the interval(s) on which f is increasing.

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(2) Evaluate using anti-derivatives

(a) (Final 2012) $\int_1^2 \frac{x^2+2}{x^2}\,\mathrm{d}x =$

(b) (Final 2007) $\int_{-1}^0 (2x - e^x)\,\mathrm{d}x =$

(c) $\int_{-3}^{10} \left(x^{5/2} + e^{2x}\right)\,\mathrm{d}x =.$