November 20

TA: Brian Powers

1. Evaluate the following definite integrals

    (a) $\int_0^2 4x^3 dx$

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

    (c) $\int_{-2}^2 (x^2 - 4)dx$

    (d) $\int_0^{1/2} \frac{dx}{\sqrt{1-x^2}}$

    (e) $\int_0^1 10e^{2x} dx$

    (f) $\int_1^3 \frac{3}{t} dt$

2. Find the area of the region bounded by the x-axis, and $y = 4 - x^2$.

3. Simplify the following expressions using the FTC.

    (a) $\frac{d}{dx} \int_3^x (t^2 + t + 1)dt$

    (b) $\frac{d}{dx} \int_{x^2}^{10} \frac{dz}{z^2+1}$

    (c) $\frac{d}{dx} \int_{e^x}^{e^{2x}} \ln t^2 dt$

4. Evaluate the following definite integrals

    (a) $\frac{1}{2} \int_0^{\ln 2} e^x dx$

    (b) $\int_{\sqrt{2}}^2 \frac{dx}{x\sqrt{x^2-1}}$

5. What value of $b > -1$ maximizes the integral

$$\int_{-1}^b x^2(3 - x)dx$$

6. Suppose f is a continuous function of t on $[0, \infty)$ and $A(x)$ is the net area of the region bounded by the graph of f and the t-axis on $[0, x]$. Show that the local maxima and minima of A occur at the zeroes of f. Verify this with $f(t) = t^2 - 10t$.