Math 2B Worksheet: Review

1. Find $\dfrac{d}{dx}\left(\displaystyle\int_2^{\sin x} \ln(x^8)dx\right)$.

2. Find the average value of the function $f(x) = 1/\sqrt{x} + 3x^2$ on $[1, 3]$.

3. The base of a solid is the region bounded by the parabolas $y = x^2$ and $y = 2 - x^2$. Find the volume of the solid if the x-sections perpendicular to the x-axis are squares with one side lying upon the base.

4. Set up but do not evaluate an integral for the volume of the solid obtained by rotating the region bounded by $y = \sqrt{x},\ y = x^2$; about the line $y = 2$.

5. Find the area of the region bounded by $x + y = 0$ and $x = y^2 + 3y$.

6. Evaluate $\displaystyle\int \frac{\sqrt{x^2 - 4}}{x} dx$.

7. Evaluate the following integrals.

(a) $\int e^{3x+e^x} dx$

(b) $\int \sin^5 x \cos^2 x \; dx$

(c) $\int e^{\sqrt{x}} dx$

(d) $\int t \sec^2 t \; dt$

8. Evaluate $\int_0^1 t^2 \ln(t^3)\, dt$

9. Determine whether the following series converge. If a convergent series is geometric or telescoping, find the sum.

$$\sum_{k=1}^{\infty} (-1)^k \frac{5k^2}{\sqrt{k^4 + 20k}}$$

$$\sum_{n=2}^{\infty} (-1)^{n+1} \frac{e^{n+2}}{5^n}$$