Math 2215 - Calculus 1
Exam #4 - 2016.10.27

Name: _____

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1. Consider the function $f(x) = -\frac{3}{4}x - \frac{1}{4}$ on the interval $[-3, 1]$. Graph this function and geometrically compute the signed area between the function and the x-axis on the interval $[-3, 1]$.

2. For the function $f(x) = -\frac{3}{4}x - \frac{1}{4}$ on the interval $[-3, 1]$ as given in problem 1, evaluate $A(n)$ (the Riemann sum approximation using n rectangles) by using right endpoints for $f(x)$ on $[-3, 1]$. Simplify fully, and then take $\lim_{n \to \infty} A(n)$, verifying your result with that of problem 1.

3. Use the Fundamental Theorem of Calculus to compute the following definite integral, verifying your results with those of problems 1 and 2.
$$\int_{-3}^{1} -\frac{3}{4}x - \frac{1}{4} \, dx$$

4. Compute the average value of $f(x) = -\frac{3}{4}x - \frac{1}{4}$ on the interval $[-3, 1]$.

5. Compute the following definite integral:
$$\int_{-\pi}^{\pi} \theta^3 \cos(\theta) - 3\theta^2 \sin(\theta) + \theta \, d\theta$$

6. Compute the following indefinite integral:
$$\int \cos^3(4z) \sin(4z) \, dz$$

7. Compute the following derivative:
$$\frac{d}{dw} \int_{2w}^{3w^2 - 2w + 1} \tan(t + 1) \, dt$$

8. Compute the following indefinite integral:
$$\int \sqrt[3]{5y + 1} \, dy$$

9. Compute the following definite integral:
$$\int_{0}^{\pi/2} \sin(2\theta) - \cos(4\theta) \, d\theta$$

10. Write the following expression as as *single* definite integral:
$$\int_{2}^{1} f(x) \, dx + \int_{1}^{5} f(x) \, dx + \int_{5}^{3} f(x) \, dx$$