MATH 2 Final Review

Although this is just for pratice, recall that for full points on the exam, you will need to show all of your work to get full points. You are expected to know the result of evaluating any trig function with the argument $n\pi/6$, $n\pi/3$, and $n\pi/2$ for any integer n. You are also expected to know the values of the inverse trig function when the result is one of the angles above.

1. State the definition of the definite integral in terms of the Riemann sum.
2. State the first part of the fundamental theorem of Calculus, include all necessary conditions.
3. State the second part of the fundamental theorem of Calculus, include all necessary conditions
4. Suppose you have a pyramid such that each cross section is a rectangle whose width is twice its length. The base has width 4 and length 8. The height of the pyramid is 2. Find **and evaluate** an integral that will give the volume of the pyramid.
5. Find the derivative of the following function

$$h(x) = \int_{-x}^{7} \frac{\sin(t)}{t} \mathrm{d}t$$

6. Find the derivative of the following function

$$h(x) = \int_{e^x}^{x^3} \cos(t^2) \mathrm{d}t$$

7. Find the following integral

$$\int \frac{1}{x \ln^2(x)} \mathrm{d}x$$

8. Find the following integral

$$\int \frac{5x}{\sqrt{x^2 - 4}} \mathrm{d}x$$

9. Find the following integral

$$\int_{\pi/3}^{7\pi/6} \cos^2(x)\sin(x)\mathrm{d}x$$

10. Find the following integral

$$\int e^x \cos(x)\mathrm{d}x$$

11. Find the following integral

$$\int_e^5 \frac{\ln(x)}{x^2}\mathrm{d}x$$

12. Find the following integral

$$\int \sin^2(x)\mathrm{d}x$$

13. Find the following integral

$$\int \tan^4(x)\sec^4(x)\mathrm{d}x$$

14. Find the following integral

$$\int \cot^3 \csc^5 \mathrm{d}x$$

15. Find the following integral

$$\int \frac{1}{x^2\sqrt{6-x^2}}\mathrm{d}x$$

16. Find the following integral

$$\int x^3 \left(x^2+1\right)^{3/2} \mathrm{d}x$$

17. Find the following integral

$$\int \frac{1}{x^2-3x+2} \mathrm{d}x$$

18. Find the following integral

$$\int \frac{1}{x^2+4x+10} \mathrm{d}x$$

19. Find the following integral

$$\int \frac{x-5}{x(3x-2)(x+1)} \mathrm{d}x$$

20. Find the following integral

$$\int_{-1}^{1} \frac{x^2}{x^2+5} \mathrm{d}x$$

21. Find the following integral

$$\int_{2}^{4} \frac{2x-3}{4x(x^2+9)} \mathrm{d}x$$

22. Find the following integral

$$\int \sin(\ln(x)) \mathrm{d}x$$

23. Find the following integral

$$\int_0^{\pi^3} \sin(\sqrt[3]{x})\mathrm{d}x$$

24. Find the following integral

$$\int_{-1}^{1} \frac{1}{x^2}\mathrm{d}x$$

25. Find the following integral

$$\int_1^{\infty} 2^{-3x}\mathrm{d}x$$

26. Find the following integral

$$\int_4^{\infty} \frac{2}{\sqrt{x-1}}\mathrm{d}x$$

27. Find the area of the region bounded by the curves $y = e^x$, $x = 0$, and $y = 2e^{-x}$
28. Crate an integral that would find the volume of the solid formed by rotating the region bounded by the curves $x^2 + 1$ and $y = 3x - 1$ around the line $x = -1$
29. Crate an integral that would find the volume of the solid formed by rotating the region bounded by the curves $x^2 + 1$ and $y = 3x - 1$ around the line $x = 0$ you must use the washer method.
30. Create an integral that would find the arc length of the following function: $y = \cos(\ln(x))$ from the point $(1, 1)$ to $(e^\pi, -1)$. (You do not have to evaluate the integral, just write it out)
31. Create **and evaluate** an integral that would find the arc length of the following function: $y^3 = x^2$ from the point $(1, 1)$ to $(8, 4)$.
32. Create **and evaluate** an integral that would find the arc length of the following parametrized function $(\cos(t^2), \sin(t^2))$ from $t = 0$ to $t = 2\pi$
33. Create **and evaluate** an integral that would find the surface area of the curve $y = x^3$ rotated around the x-axis from the point $(0, 0)$ to $(2, 8)$
34. Create an integral that would find the surface area of the curve $y^2 = x - 3$ from the point $(4, -1)$ to $(4, 1)$ rotated around the line $x = -1$ (You do not have to evaluate the integral, just write it out).