Math 1B Midterm 2 Non-Volume Review

- [1] Find the area of the region between $y = x^2$ and y = 2x + 3 on [0, 4].
- [2] Find the area of the region between $y = 4 x^2$ and $y = x^2 2x$ on [0, 4].
- [3] Find the length of the curve $y = \frac{1}{8}x^4 + \frac{1}{4x^2}$ on [1, 2].
- [4] Find the length of the curve $y = e^{2x} + \frac{1}{16e^{2x}}$ on [0, 1].
- [5] Find the length of the curve $y = \int_{2}^{x} \sqrt{t^2 2t} dt$ on [2, 5].
- [6] Find the length of the curve $y = \int_{0}^{x} \sqrt{(t+1)(t+3)} dt$ on [0, 2].

Use fnInt for all questions below

- [7] Find the area of the surface generated by revolving $y = \frac{1}{x}$ on [1, 4] around the x-axis.
- [8] Find the area of the surface generated by revolving $y = \ln x$ on [1, 4] around the x-axis.
- [9] A spherical tank of radius 4 feet containing water is buried underground, so that its center is 8 feet below ground level.
 - [a] Find the work done in pumping the water to ground level
 - [i] if the tank is full.
 - [ii] if the tank is half full.
 - [b] Find the work done in pumping the top half of the water to ground level if the tank is full.
- [10] Find the hydrostatic force on the window of an aquarium
 - [a] if the window is a circle of radius 1 foot with the center 10 feet below the surface of the water
 - [b] if the window is a semicircle of radius 1 foot with the flat side up and 10 feet below the surface of the water
 - [c] if the window is a triangle of height 1 foot and base 2 feet with the base up and 10 feet below the surface of the water
 - [d] if the window is a triangle of height 1 foot and base 2 feet with the base down and 10 feet below the surface of the water
- [11] Using the surface area formula, find the surface area of the lateral face (ie. not the circular base) of a cone of radius r and height h.

[12] A solid of revolution has volume
$$\int_{0}^{\pi} 2\pi (y+1)(1-\cos y) dy$$
. Find the region and the axis of revolution.

[13] A solid of revolution has volume $\int_{1}^{4} \pi ((3+x)^2 - (3-\sqrt{x})^2) dx$. Find the region and the axis of revolution.