

Math 1B
Midterm 2 Non-Volume Review

- [1] Find the area of the region between $y = 4 - x^2$ and $y = x^2 - 2x$ on $[0, 4]$.
- [2] Find the value of c guaranteed by the Integral Mean Value Theorem for $f(x) = x^2 + 2x$ on the interval $[0, 3]$.
- [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 $y = \int_2^x \sqrt{t^2 - 2t} dt$ on $[2, 5]$.
- [5] [a] Write a dx integral for the area of the surface generated by revolving $y = x^3$ on $[2, 3]$ around the x -axis.
[b] Write a dy integral for the area of the surface generated by revolving $y = x^3$ on $[2, 3]$ around the x -axis.
[c] Write a dx integral for the area of the surface generated by revolving $y = x^3$ on $[2, 3]$ around the y -axis.
[d] Write a dy integral for the area of the surface generated by revolving $y = x^3$ on $[2, 3]$ around the y -axis.
[e] Evaluate either of the two integrals above which can be evaluated using only the techniques in section 5.4 and 5.5.
- [6] 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 .
- [7] A 20 foot chain hangs off the edge of a 50 foot building. The density of the chain x feet from the bottom end is given by $\rho(x) = 1 + x$ pounds per foot. Find the work done in pulling the chain to the top of the building.
- [8] 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.
- [9] 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.
- [10] Find the centroid of the region bounded by $y = 4x - x^2$ and $y = x - 4$.

Use fnInt for all questions below

- [11] 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.
- [12] 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