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 area under the curve $y = \cos^{-1} x$.

[3] A solid of revolution has volume $\int_0^{\pi} 2\pi(y+1)(1-\cos y)\, dy$. Sketch the region and the axis of revolution.

<u>Do not use the *x*– nor *y*–axes as boundaries nor the axis of revolution.</u>

[4] A solid of revolution has volume $\int_1^4 \pi((3+x)^2 - (3-\sqrt{x})^2)\, dx$. Sketch the region and the axis of revolution.

<u>Do not use the *x*– nor *y*–axes as boundaries nor the axis of revolution.</u>

[5] Find the average value of $f(x) = \dfrac{\sin x}{1 + 4\cos^2 x}$ on $\left[\dfrac{\pi}{6}, \dfrac{\pi}{3}\right]$.

[6] If the average value of f on $[-5, 6]$ is 7 and the average value of f on $[2, 6]$ is -1, find $\int_{-5}^{2} f(x)\, dx$.

[7] Find the value of c guaranteed by the Mean Value Theorem for Integrals for $f(x) = \sqrt{64 - (x-2)^2}$ on $[-6, 2]$.

[8] Find the length of the curve $y = \dfrac{1}{8}x^4 + \dfrac{1}{4x^2}$ on $[1, 2]$.

[9] Find the length of the curve $y = \int_2^x \sqrt{t^2 - 2t}\, dt$ on $[2, 5]$.

[10] Find the length of the parametric curve $\begin{aligned} x &= \dfrac{9}{4}t^4 - 2t^2 + 5 \\ y &= 4t^3 - 2 \end{aligned}$ over $1 \le t \le 2$.

[11] Find the length of the parametric curve $\begin{aligned} x &= e^{at}\cos bt \\ y &= e^{at}\sin bt \end{aligned}$ over $0 \le t \le 1$.

[12] Find the area of the surface created by revolving the arc of $f(x) = \sqrt[3]{x}$ on $[0, 8]$ about the $y-$axis.

[13] Find the area of the surface created by revolving the arc of $f(x) = \dfrac{x^4 + 3}{6x}$ on $[1, 2]$ about the $x-$axis.

[14] A continuous random variable X with mean value 5.4 has probability density function $f(x) = \begin{cases} kx^n, & 0 \le x \le 9 \\ 0, & x < 0 \quad or \quad x > 9 \end{cases}$

for some constants k and n.

[a] Find k and n.

[b] Find c such that the probability that X is less than c or greater than c are the same.
(This is called the median value of X.)