MA 1723 Section 52   *Practice Exam 1*   *November 19, 2019*

Follow the instructions for each question and show enough of your work so that I can follow your thought process. If I can't read your work, answer or there is no justification to a solution, you will receive little or no credit!

1. Differentiate the following function:

$$g(x) = \int_1^x \cos(t^2) \, dt \ .$$

2. Differentiate the following function:

$$f(x) = \int_x^{x^2} \frac{\sin(y^4 + 1)}{y^2 + \ln y} \, dy \ .$$

3. Evaluate the following integral:

$$\int \frac{\sin \sqrt{x}}{\sqrt{x}} \, dx \ .$$

4. Evaluate the following integral:

$$\int_1^2 x\sqrt{x - 1} \, dx \ .$$

5. Sketch the region enclosed by $y = 12 - x^2$ and $y = x^2 - 6$ and find its area.

6. Sketch the region enclosed by $y = \sqrt{x - 1}$ and $x - y = 1$ and find its area.

7. Find the volume of the solid obtained by rotating the region bounded by $y = 6 - x^2$ and $y = 2$ about the x-axis.

8. Find the volume of the solid obtained by rotating the region bounded by $y = x^2$ and $x = y^2$ about the y-axis.

9. Find the volume of the solid obtained by rotating the region bounded by $y = 4x - x^2$ and $y = x$ about the x-axis.

10. Find the volume of the solid obtained by rotating the region bounded by $y = \sqrt{x}$ and $x = 2y$ about the line $y = 2$.

11. If the work required to stretch a spring 1 ft beyond its natural length is 12 ft-lb, how much work is needed to stretch it 9 in?

12. A force of 40 N is required to hold a spring that has been stretched from its natural length of 10 cm to a length of 15 cm. How much work is done in stretching the spring from 15 cm to 18 cm?

13. Show the following inequality holds:

$$2 \leq \int_{-1}^{1} \sqrt{1 + x^2} \, dx \leq 2\sqrt{2} \ .$$