TMAT/AMAT 119 Practice Midterm 1

Name: _____

Information: Solutions to this practice exam will not be collected. The exam may take you longer than today's class time, and you are welcome to finish at home. Solutions will be posted online this weekend, and you are welcome to come discuss the exam at office hours, including those after this class.
For this practice exam, you can use your notes. For the actual exam, you may bring one page of handwritten notes. No calculators, phones, etc. will be allowed. The actual exam may be longer than this one.

1. Compute the area bounded by $y = \sin(x)$ and $y = \cos(x)$ from $x = 0$ to $x = \pi/2$.

2. Compute the area bounded by the curves $y = \sqrt{x-1}$ and $x - y = 1$.

3. Consider the solid S obtained by rotating the region bounded by $y^2 = x$ and $x = 2y$ about the y-axis. Compute the volume of S.

4. Consider the solid S obtained by rotating the region bounded by $y = x^2$, $y = 0$ and $x = 2$ about the line $x = 4$. Compute the volume of S using the method of cylindrical shells.

5. Consider the solid obtained by rotating the region bounded by $x = \sin(y)$, $y = 0$ and $x = \pi/4$ about the line $x = \pi$. Write down an integral for the volume of this solid using the washer method. You do not have to compute this integral, just write it down (and explain your answer).

6. Compute $\displaystyle\int_{-3}^{-2} x\sqrt{x+3}\,dx$. HINT: First find an expression for $\displaystyle\int (x+3)^n\,dx$, for $n \neq 1$.

7. Find a value of k such that the average value of $f(x) = x^3 + k$ over the interval $[0, 2]$ is 10.

8. Compute $\displaystyle\int_1^7 \frac{\ln x}{\sqrt{x}}\,dx$.

10. Assuming f and g are continuous, and h is differentiable, simplify the following expression: $\displaystyle\frac{d}{dx}\int_a^{h(x)} [f(g(t)) + c]\,dt$. [Hint: Use the chain rule and FTC part 1.]

11. Compute $\displaystyle\int xe^{-x^2}\,dx$.

12. Compute $\displaystyle\int_0^1 t^2\sqrt{2t^3+1}\,dt$.