Spring 2020 Math 152

Week 2 in Review

courtesy: David J. Manuel

(covering 5.5, 6.1, and 6.2)

(Problems with a * beside them will also be done in Python)

1 Section 5.5

1. Evaluate the following integrals:
   (a) $\displaystyle\int_0^2 \frac{dx}{(3x+2)^2}$
   (b) $\displaystyle\int \frac{\cos(\ln x)}{x}\,dx$
   (c) $\displaystyle\int_0^1 xe^{-x^2}\,dx$*
   (d) $\displaystyle\int_0^{\frac{1}{2}\ln 3} \frac{e^x}{e^{2x}+1}\,dx$
   (e) $\displaystyle\int x^3\sqrt{x^2+1}\,dx$

2 Section 6.1

1. Find the area bounded by the graph of $y = 6x - x^2$ and the line $y = 2x$
2. Find the area bounded by the graphs of $y = x^3 + 3x^2 - 4x$ and $y = 2x^2 + 4$.
3. Find the area bounded by the curves $y = \dfrac{6}{1+x^2}$ and $y = \dfrac{1}{2}x^2$. *
4. Find the area of the region bounded by $x + 2y = 7$ and $y^2 - 6y - x = 0$.
5. Find the area in the first quadrant to the left of $y = \ln x$ and below $y = 1$.
6. Sketch a region whose area is represented by the integral $\displaystyle\int_{-2}^{\sqrt{2}} (\sqrt{4-x^2} - x)\,dx$.

3 Section 6.2

1. Find the volume of the solid formed by rotating the region above the x-axis (closest to the origin) bounded by the curves $y = \sin x$ and $y = 0$ about the x-axis.
2. Set up, but do not evaluate, an integral to find the volume of the solid formed by rotating the region bounded by $y = 2x^2 + 1$ and $y = 3x$ about the x-axis.*
3. Find the volume of the solid formed by rotating the region bounded by the curves $y = \sqrt{x}$, $x = 0$, and $y = 2$ about the y-axis.
4. Find the volume of the solid formed by rotating the region in the previous example about the line $y = -1$.
5. Find the volume of a square pyramid whose height is h and whose base is s by s.
6. The base of a solid is the unit circle in the x-y plane. Cross-sections perpendicular to the x-axis are equilateral triangles. Find the volume of the solid.