

Spring 2020 Math 152

Week in Review IV

courtesy: David J. Manuel

(covering 7.1, 7.2, and Exam I Review)

1 Section 7.1

1. Evaluate the following integrals:

(a) $\int x \cos x \, dx$

(b) $\int_0^1 x^2 e^{-2x} \, dx$

(c) $\int x^2 \ln x \, dx$

2 Section 7.2

1. Evaluate the following integrals:

(a) $\int_0^{\pi/2} \sin^2 x \cos^3 x \, dx$

(b) $\int_0^{\pi/4} \tan^2 x \sec^4 x \, dx$

(c) $\int \cos^4 x \, dx$

3 Exam I Review

1. Evaluate the following integrals:

(a) $\int_1^e \frac{\sqrt{\ln(x)}}{x} \, dx$

(b) $\int x\sqrt{1-9x^2} \, dx$

2. Find the area of the regions bounded by the following curves:

(a) The parabola $y = x^2$, the x -axis, and the line tangent to the parabola at $x = 1$.

(b) $y = x^3$ and $y = 16 - x^3$.

3. Find the volumes of the solids described below:

(a) Formed by rotating the region bounded by $y = \frac{1}{x}$, $y = 0$, $x = 1$, and $x = 5$ about the x -axis.

(b) Formed by rotating the region bounded by the x -axis, $x = 1$, and $y = x^3$ about the line $x = 1$.

(c) Base of the solid is the region enclosed by the y -axis, $y = 1$, and $y = \sqrt{x}$. Cross-sections perpendicular to the y -axis are semicircles.

4. A 50-foot rope that weighs 25 pounds hangs from the top of a large building. How much work is required to pull 10 feet of rope to the top?

5. A conical tank is 3m tall, has a 2m radius across the top, and has a 0.5m spout extending from the top. If the tank is full of water, find the work required to pump all the water out of the tank (use ρg for the weight density of the water).