Mathematics 1210-2,3 Prof. Ken Golden PRACTICE FINAL EXAM ANSWER KEY Fall 2009

- 1. $\frac{103}{6} = 17\frac{1}{6}$
- 2. $V = \frac{4}{3}\pi ab^2$
- 3. $V = \frac{\pi}{2}$
- 4. $\frac{\sqrt{5}\pi}{2}$
- 5. $\frac{2}{5}(2^{5/2}-1)$
- 6. $W = \frac{3^8}{56} \sim 117.16$ inch-pounds.
- 7. W = 32 dynes.
- 8. $\int_{x=0}^{x=1} 2\pi x(x^3) dx = 2\pi |_0^1 \frac{x^5}{5} = \frac{2\pi}{5}$

The centroid of the region is $(\bar{x}, \bar{y}) = (\frac{4}{5}, \frac{2}{7})$. The area of the region is $\frac{1}{4}$. The distance swept out by the centroid is 2π times $\frac{4}{5}$, its distance from the axis of revolution. Multiplying these according to Pappus' volume theorem (there is also an area theorem) gives $\frac{1}{4}(2\pi\frac{4}{5} = \frac{2\pi}{5})$, confirming Pappus' Theorem in this case.

9. T(x) = -2x + 4