Math 1B **Final Exam Review**

Chapter 6

Find the area of the region bounded by the given curves/lines.

1. $y = x^2 - 6$ and $y = x$

2. $y = \sec(x)$, $y = 2\tan(x)$, from $x = 0$ to $x = \frac{\pi}{6}$

Find the area of the region described. <u>Draw a typical rectangle in the diagram as well as the associated disk, washer or cylindrical shell</u>.

3. $y = \sin x$ and the x-axis, $0 \le x \le \pi$, rotated about the x-axis

4. $y = \ln(x)$, and the x-axis, $1 \le x \le e$, rotated about the y-axis

5. $y = \sin(x)$ and $y = \cos(x)$, $0 \le x \le \frac{\pi}{4}$, rotated about the x-axis

Chapter 7: Evaluate each using a technique of integration.

6. $\int x^3 e^{x^2} dx$

7. $\int x \tan^{-1} x \, dx$

8. $\int e^{\sqrt{x}} dx$

9. $\int x \sin x \cos x \, dx$

10. $\int (\cos + \sin x)^2 \, dx$

11. $\int \tan^3 x \sec^3 x \, dx$

12. $\int \frac{1}{x^2\sqrt{4 + x^2}} \, dx$

13. $\int \frac{1}{\sqrt{x^2 - 1}} \, dx$

14. $\int \frac{1}{x^3 + x^2} \, dx$

15. $\int \frac{1}{\sqrt{x}(1 + \sqrt{x})} \, dx$

Determine whether the improper integral converges or diverges. If it converges, find its value. (Note: #16 has changed from its original form.)

16. a) $\int_1^\infty \frac{\sqrt{\ln x}}{x} \, dx$

b) $\int_1^\infty \frac{\ln x}{x^2} \, dx$

17. $\int_0^1 \frac{x - 1}{\sqrt{x}} \, dx$

Chapter 8: Set up the integral and simplify the integrand—but do not solve—for the requested value.

18. The arc length of the function on the given interval.

$y = x^{3/2}$, for $2 \le x \le 5$

19. The area of the surface of revolution.

$y = x^{3/2}$, for $2 \le x \le 5$, about the y-axis.