

College of the Redwoods  
Mathematics Department

Math 50B — Integral Calculus  
Final Exam

David Arnold

### Quiz Questions

**Read Carefully!** Place the solution to each exercise on a separate sheet of paper. When finished, arrange your solutions in order, place these exam page(s) on top of your solutions, then place your name on your exam. Good luck!

EXERCISE 1. Find the area between the two curves defined by

$$y^2 = 4x \quad \text{and} \quad y = 2x - 4.$$

Please include a detailed sketch that shows the “fundamental strip(s).”

EXERCISE 2. Find the volume of the solid that results when the region enclosed by

$$x = y^2 \quad \text{and} \quad y = x$$

is revolved about the line  $y = -1$ . Use “fundamental strips” that are perpendicular to the axis of rotation. Please include a detailed sketch.

EXERCISE 3. Determine the surface area of a sphere of radius  $r$  by rotating the appropriate curve about the  $x$ -axis.

EXERCISE 4. Find the following indefinite integral.

$$\int x^2 \sin x \, dx$$

EXERCISE 5. Use trigonometric substitution to find the following indefinite integral.

$$\int \frac{\sqrt{4-x^2}}{x^2} \, dx$$

EXERCISE 6. Find the sum of the series defined by

$$\sum_{n=0}^{\infty} \frac{1}{n^2 + 5n + 6}.$$

*Hint: Partial fraction decomposition.*

EXERCISE 7. Consider the function defined by

$$f(x) = \sqrt{1+x}.$$

- Find  $T_3(x)$ , the third degree Taylor polynomial. Expand around  $x = 0$ .
- Use Taylor’s inequality to estimate the accuracy of the approximation  $f(x) \approx T_3(x)$  when  $x$  lies in the interval  $(-1, 1)$ .