

Math 142 Week In Review
Problem Set #9
(6.2, 6.4, 6.5)
Instructor: Jenn Whitfield

Section 6.2

1. Find $\int 2x(x^2 + 15)^{14} dx$

2. Find $\int x^6 e^{x^7} dx$

3. Find $\int \frac{16x^7}{(3 - x^8)^2} dx$

4. Find $\int 3x\sqrt{8-x^2} dx$

5. Find $\int \frac{15x^3}{3+5x^4} dx$

6. Find $\int \frac{e^x + 5e^{-5x}}{(e^x - e^{-5x})^4} dx$

7. Find $\int \frac{x}{\sqrt{x-2}} dx$

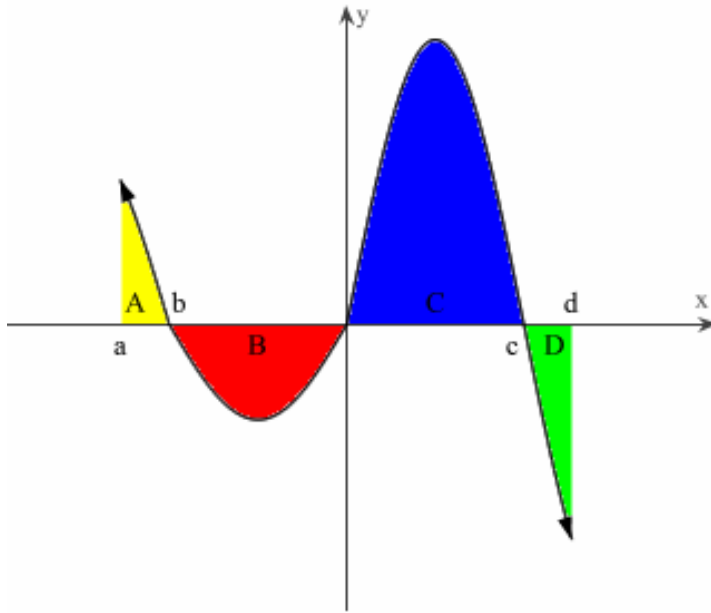
8. A contaminated lake is treated with a bactericide. The rate of increase in harmful bacteria t days after the treatment is given by the function $\frac{dN}{dt} = -\frac{3000t}{(1+t^2)}$ for $0 \leq t \leq 8$. $N(t)$ is the number of bacteria per milliliter of water.

- Find the minimum value of $\frac{dN}{dt}$.
- If the initial count was 8000 bacteria per milliliter, find $N(t)$ and then find the bacteria count after 8 days.
- When (to two decimal places) is the bacteria count 5000 bacteria per milliliter?

Section 6.4

9. Calculate S_6 for the function $f(x) = x^2 - 5x - 8$ on $[1, 7]$. Partition the interval into six subintervals of equal length, and let $c_1 = 1$, $c_2 = 3$, $c_3 = 3$, $c_4 = 5$, $c_5 = 5$, and $c_6 = 7$.

10. Calculate the following definite integrals by referring to the figure with the indicated areas.



Area A = 1.593

Area B = 2.203

Area C = 5.787

Area D = 1.609

a) $\int_b^0 f(x)dx$

b) $\int_a^c f(x)dx$

c) $\int_a^d f(x)dx$

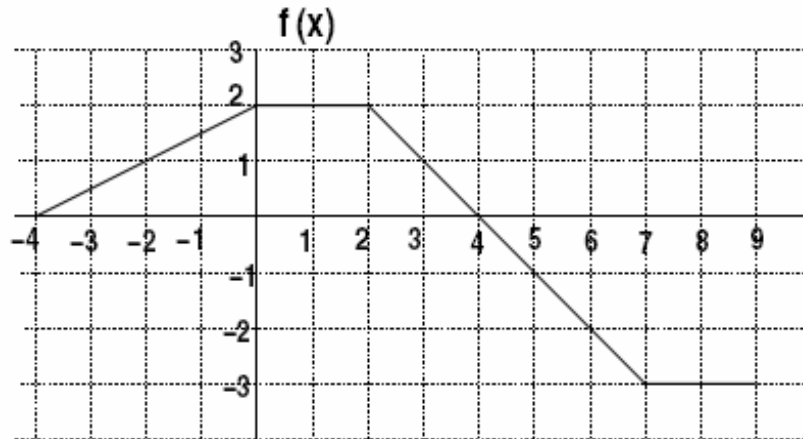
d) $\int_d^c f(x)dx$

11. Use L_6 and R_6 to approximate $\int_3^6 (0.25x^2 - 4)dx$. Compute error bounds for each.

12. During a special study on learning, a psychologist found that, on the average, the rate of learning of special symbols in a code, $N(x)$, after x days of practice was given approximately by the table below. Use left and right sums over 3 equal subintervals to approximate the area under the graph of $N(x)$ from $x = 6$ to $x = 12$. Calculate an error bound for this estimate.

x	0	2	4	6	8	10	12
$N(x)$	29	25	22	18	17	16	13

13. Use the graph to compute the following definite integrals.



a) $\int_0^4 f(x)dx$

b) $\int_{-4}^4 f(x)dx$

c) $\int_1^8 f(x)dx$

Section 6.5

14. Answer the following questions about $F(x) = -x^2 + 35x + 285$.

- Calculate the change in $F(x)$ from $x = 10$ to $x = 15$.
- Graph $F'(x)$ and use geometric formulas to calculate the area between the graph of $F'(x)$ and the x -axis from $x = 10$ to $x = 15$.

15. Evaluate the following integrals.

a) $\int_1^2 5x dx$

b) $\int_1^6 (2x + 7) dx$

c) $\int_0^3 e^{2x} dx$

$$\text{d) } \int_4^7 \frac{1}{x-3} dx$$

$$\text{e) } \int_1^3 xe^{-x^2} dx$$

16. Find $\int_1^A (4x - 3x^2)(22x^2 - 11x^3)^6 dx$ given A is a positive integer greater than 5.

17. Find the average value of the function $f(x) = 500 - 30x$ over the interval $[0, 2]$.

18. A yeast culture weighing 2 grams is removed from a refrigerator unit and is expected to grow at a rate of $W'(t) = 0.4e^{0.4t}$ grams per hour at a higher controlled temperature. How much will the weight of the culture increase during the first 6 hours of growth? How much will the weight of the culture increase from the end of the 6th hour to the end of the 12th hour of growth?