

Week in Review # 7

MATH 142
Section 6.1, 6.2, 6.4

Drost-Spring 2010
April 4, 2010

1. $\int (-4) dx$

2. $\int (2x) dx$

3. $\int e^3 dt$

4. $\int 24\sqrt{x} dx$

5. $\int (x - e^x) dx$

6. $\int x^4(4 + x^3) dx$

7. $\int \frac{5}{t^2} dt$

8. $\int \frac{1 - x^3}{x^4} dx$

9. $\int \left(\frac{3}{x^4} - \frac{12}{x^2} + 1 \right) dx$

10. $\int \frac{1 - xe^x}{x} dx$

11. *Sales analysis.* Monthly sales of a particular personal computer are expected to decline at the rate of

$$S'(t) = -25t^{\frac{2}{3}}$$

computers per month, where t is time in months and $S(t)$ is the number of computers sold each month. The company plans to stop manufacturing this computer when monthly sales reach 800 computers. If monthly sales now ($t = 0$) are 2000 computers, find $S(t)$. How long will the company continue to manufacture this computer? *Source: CALCULUS, by Barnett, p.371, #111*

12. The rate of change of salary for a minor league ballplayer is modeled by $-400 + 1500\sqrt{x}$ over the interval $[1, 16]$ with $S(1) = 1100$. Find the ballplayer's salary his 10th year.

13. A bacteria culture is growing at the rate $W'(t) = 0.4e^{0.1t}$ grams per hour. If the culture weighed 2 grams originally, what is the weight of the culture $W(t)$

- a. after t hours?
b. after 90 minutes?

14. $\int \frac{1}{2x + 5} dx$

15. $\int e^{-x^2} \cdot x dx$

16. $\int 12x^2\sqrt{x^3 + 1} dx$

17. $\int \frac{x}{\sqrt{x + 12}} dx$

18. $\int x(x + 2)^3 dx$

19. $\int \frac{x^2 + 2x}{(x^3 + 3x^2 + 2)^4} dx$

20. $\int \frac{(\ln x)^3}{x} dx$

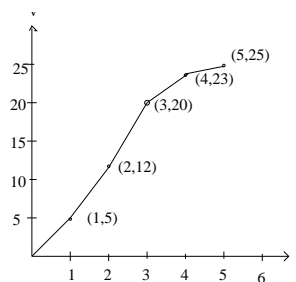
21. $\int \frac{\sqrt{\ln x}}{x} dx$ ans: $\frac{2}{3}(\ln x)^{\frac{3}{2}} + C$

22. $\int \frac{x}{\sqrt[5]{2x^2 + 5}} dx$ ans: $\frac{5}{16}(2x^2 + 5)^{\frac{4}{5}} + C$

23. $\int 5x e^{4-x^2} dx$ ans: $-\frac{5}{2}e^{4-x^2} + C$

24. Find the revenue function for a purse manufacturer if the marginal revenue is given by $(1 - x)e^{2x-x^2}$, where x is the number of thousands of purses sold. ans: $\frac{1}{2}e^{2x-x^2} - \frac{1}{2}$

25. An object travels with a velocity function given in the following figure. Find an upper and lower estimate of the distance traveled by the object.



26. If $f(x) = -(x - 4)^2 + 20$, approximate the area under the curve $f(x)$ and above the x -axis from $x = 0$ to $x = 6$, using 3 rectangles from

- a. the left.
b. the right.

27. How many rectangles should be used in the previous problem so that the error is less than 1?

28. Find the exact value using geometry: $\int_0^3 \sqrt{9 - x^2} dx$ ans: $\frac{9}{4}\pi$

29. From a study on memorizing facts, a researcher found on average, the rate of learning facts, $N'(x)$ after x hours of studying was defined approximately by the following values:

x	0	2	4	6	8	10	12
$N'(x)$	30	26	22	20	18	16	12

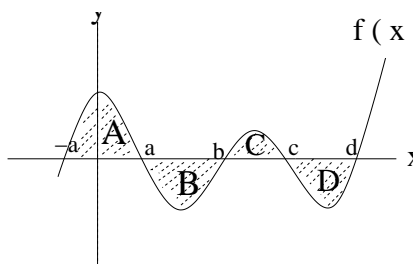
Use left and right sums over three equal sub-intervals to approximate the area under the graph of $N'(x)$ from $x = 6$ to $x = 12$. Calculate the error bound.

Fill in the blanks:

$$\underline{\hspace{2cm}} \leq \int_6^{12} N'(x) dx \leq \underline{\hspace{2cm}}$$

30. Evaluate the definite integrals below given:

$$A = 2.4, B = 1.25, C = 0.5, D = 1.5$$



- a) $\int_{-a}^d f(x) dx$
 b) $\int_a^c f(x) dx$
 c) $\int_b^c f(x) dx$
 d) $\int_d^b f(x) dx$

Use the Properties of definite integrals, and

$$\int_0^3 x dx = 4.5, \int_0^3 x^2 dx = 9, \int_3^6 x^2 dx = 63$$

to evaluate each of the following:

31. $\int_0^3 6x dx$
 32. $\int_0^3 4x^2 dx$
 33. $\int_3^6 6x^2 dx$
 34. $\int_6^3 5x^2 dx$

35. $\int_0^3 (5x + 3x^2) dx$

