HOMEWORK #14

Math 106 Review Packet for Exam #2

Due Tuesday March 20 at the beginning of class.

Limit Definition of the Definite Integral

1. Evaluate $\int_0^2 x^2 - 7x + 3 \; dx$ using the Limit Definition of the Definite Integral.
2. Evaluate $\int_1^4 9x - x^2 \; dx$ using the Limit Definition of the Definite Integral.
3. Compute $\int_2^5 3 - x \; dx$ using three different methods: (a) using Area interpretations of the definite integral, (b) Fundamental Theorem of Calculus, and (c) Limit Definition.

Differentiation Answer each of the following questions regarding derivatives:

4. Compute $\frac{d}{dx} \int_x^7 1 - \sin t \; dt$
5. Find $g''(x)$ if $g(x) = \int_{3x}^7 7t^2 + \sin t \; dt$.

Integration Evaluate each of the following integrals:

6. $\int \frac{1}{\sqrt[3]{(7-5z)^2}} \; dz$
7. $\int_{-3}^3 |x^2 - 1| \; dx$
8. $\int_{-3}^3 x|x| \; dx$
9. $\int_0^{\frac{\pi}{8}} \tan^3(2x)\sec^2(2x) \; dx$
10. $\int_0^{\frac{\pi}{3}} \frac{3\sin x \cos x}{(1+3\sin^2 x)^2} \; dx$
11. $\int 7\cos(5x) - 5\sin(7x) \; dx$
12. $\int (x^{\frac{7}{2}} + x^{-\frac{1}{3}})\sqrt{x} \; dx$
13. $\int x(x+1)^{14} \; dx$ *challenge*

14. $\displaystyle\int_1^2 \frac{x^2+2}{x^2}\ dx$

15. $\displaystyle\int_2^6 \frac{1}{x^2}\sin\left(\frac{\pi}{x}\right)\ dx$

16. $\displaystyle\int_1^7 \frac{1}{\sqrt{2x+2}}\ dx$

17. $\displaystyle\int \frac{x\sin\sqrt{x^2+4}}{\sqrt{x^2+4}}\ dx$

18. $\displaystyle\int_3^5 \frac{x}{(30-x^2)^2}\ dx$

19. $\displaystyle\int \frac{\sqrt{7}}{\sqrt{x}(\sqrt{x}+4)^2}\ dx$

20. $\displaystyle\int x\left(\sqrt{x^2+1}+\frac{1}{\sqrt{x^2+1}}\right)\ dx$

21. $\displaystyle\int_0^4 \sqrt{x}+\sqrt{2x+1}\ dx$

22. $\displaystyle\int \sqrt{3}\ x(x^2+\pi)^{-\frac{12}{7}}\ dx$

23. $\displaystyle\int_{-1}^{\frac{1}{2}} 1+x+x^2+x^3\ dx$

24. $\displaystyle\int_0^{\frac{\pi}{2}} \sec^2\left(\frac{x}{2}\right)\ dx$

25. $\displaystyle\int_{\frac{\pi}{12}}^{\frac{\pi}{6}} \sec(2x)\tan(2x)\ dx$

26. $\displaystyle\int \frac{\sqrt{1+\sqrt{x}}}{\sqrt{x}}\ dx$

27. $\displaystyle\int \sqrt{1+\sqrt{x}}\ dx$ *challenge*

Displacement–Total Distance–Net Change

28. Suppose that the velocity of a moving particle is $v(t) = t^2 - 11t + 24$ feet per second. Find both the displacement and total distance it travels between time $t = 0$ and $t = 10$ seconds.

29. How much wood would a woodchuck chuck if a wood chuck could chuck wood at a rate of $2t + 1$ logs per hour, and the woodchuck chucks for 8 hours? (t=hours since the chucking began)