Math 1042 **Test 3 Review – Even Answer Key** **Summer 2009**

Section 5.4

30. Let $F(x)=\int_1^x \sin t^2 dt$. Then $\int_1^{1/x} \sin t^2 dt = F(1/x)$ and so, by chain rule,

$$\frac{d}{dx}\int_1^{1/x} \sin t^2 dt = \frac{d}{dx}F(1/x) = \sin\left(\left(\frac{1}{x}\right)^2\right)\cdot\left(-\frac{1}{x^2}\right) = -\frac{\sin(1/x^2)}{x^2}.$$

Section 5.6

86. $\frac{1}{2}\ln 2$

Section 5.7

6. $\ln 2$

Section 6.3

12. $\frac{\pi}{2}$ **26.** 8π

Section 7.2

50. $\frac{\pi}{4}-\frac{1}{2}\ln 2$

Section 7.3

26. $-\frac{1}{499}\cos^{499} y + \frac{1}{501}\cos^{501} y + C$

36. $\frac{1}{9}\tan^9 x + \frac{1}{7}\tan^7 x + C$

Section 7.6

28. $x + \ln|x| - 3\ln|x+1| + C$

30. $2\ln|x-1| + \frac{1}{2}\ln|x^2+1| - 3\tan^{-1} x + C$

Section 7.7

36. $\frac{3}{4e^2}$ **46.** 1

Section 10.2

16. Diverges by divergence test **24.** $\frac{1}{e-1}$ **26.** $10+\frac{5}{3}=\frac{35}{3}$

Section 10.3

36. Diverges **38.** Converges

Section 10.4

8. Diverges by the Divergence Test

Section 10.5

22. Converges for all r by the Ratio Test: $\rho = \lim_{n\to\infty}\left|\frac{a_{n+1}}{a_n}\right| = \lim_{n\to\infty}\frac{|r|}{n+1} = 0\cdot|r| = 0 < 1$

46. Geometric series with $|r|=\frac{1}{16}$ - converges

48. Diverges by the Divergence Test.

Section 10.6

4. The radius of convergence is R = 9 and interval of convergence is a) $(-4,14)$ b) $[-4,14)$ and c) $[-4,14]$.

10. The radius of convergence is R = 1/5 and interval of convergence is $[14/5, 16/5]$.

20. The radius of convergence is R = 1/2 and interval of convergence is $[-7/2, -5/2)$.

38. 2

Section 10.7

2. $1 + 2(x-3) + 6(x-3)^2 + \frac{1}{2}(x-3)^3$

4. Valid for $|x| < 1$

$$\sum_{n=0}^{\infty} x^{4n+1}$$

8. Valid for all x.

$$\sum_{n=o}^{\infty} \frac{4^n x^n}{n!}$$

12. Valid for all x.

$$\sum_{n=0}^{\infty} \frac{x^{2n+2}}{n!}$$

50. $\int_0^1 \cos(x^2)\,dx =$

$$\sum_{n=0}^{\infty} \frac{(-1)^n}{(2n)!(4n+1)}$$

52. $\int_0^2 e^{-x^3}\,dx =$

$$\sum_{n=0}^{\infty} \frac{(-1)^n}{n!(3n+1)}$$

Extra: $\frac{1}{2} + \frac{\sqrt{3}}{2}\left(x - \frac{\pi}{6}\right) - \frac{1}{4}\left(x - \frac{\pi}{6}\right)^2 - \frac{\sqrt{3}}{12}\left(x - \frac{\pi}{6}\right)^3 + \cdots$