Math 1553-2 Homework

7.1: 3, 7, 10, 15, 21, 24, 30, 37, 49, 51*, 52, 54*

7.2: 1, 3, 7, 11, 17, 21, 25, 29, 33*, 44, 45, 47*, 57, 61, 65

7.3: 4, 7, 13, 16, 19*, 21, 22, 27, 30*, 35

• **Due January 22 (Tuesday):** The above asterisked problems.

• **Extra Credit (1). Due January 23 (Wednesday):** Page 470, #72

7.4: 3, 6, 7, 9, 14, 17, 21, 25*, 28, 29, 31, 33, 37, 41, 46, 51*, 59, 62

7.5: 5, 9, 14*, 17, 23, 32, 37, 39, 43, 55, 62, 63*, 71, 81, 82

• **Due January 28 (Monday)**: The above asterisked problems.

• **Extra Credit (2). Due January 29 (Tuesday):** If f is a quadratic function such that $f(0) = 1$ and

$$\int \frac{f(x)}{x^2(x+1)^3}\,dx$$

is a rational function, find the value of $f'(0)$.

(Hint: A quadratic function $f(x)$ with $f(0) = 1$ must be of the form $f(x) = ax^2 + bx + 1$. Then $f'(0) = b$. Hence you need to find the value of b so that the above integral is a rational function. This problem appears to be very hard. But when you think a little bit harder, you will realize that it is a very easy problem. Enjoy it!)

7.7: 8, 11, 15*, 18, 19, 47, 49*, 50

7.8: 6, 11, 17*, 21, 26, 32, 35*, 40, 49, 53, 60, 75

10.1: 9, 11, 14, 17, 21, 22, 37, 43

• **Due February 4 (Monday):** The above asterisked problems.

• **Extra Credit (3). Due February 5 (Tuesday):** Find the value of the constant C for which the integral

$$\int_0^\infty \left(\frac{x}{x^2+1} - \frac{C}{3x+1}\right) dx$$

converges. Evaluate the integral for this value of C.

10.2: 5, 11, 13, 16, 19, 29, 31, 34, 37, 42, 43, 53, 57, 61, 63

10.3: 17, 24, 29, 36, 41, 45, 55, 57, 61, 65

10.4: 18, 19, 21, 25, 27, 31, 33, 45, 47, 48

Exam (1) 2/14/2013 (Thursday). Sections: 7.1–7.5, 7.7, 7.8, and 10.1–10.4

11.1: 23, 28, 31, 35, 37, 40, 43, 45, 47, 50, 52*, 55, 64, 70(b)*, 79*, 80

11.2: 17, 19, 23*, 25, 28, 31, 32, 33, 35*, 39, 41*, 49, 51, 54*, 59, 61, 64

• **Due February 25 (Monday):** The above asterisked problems.

11.3: 7*, 8, 10, 15, 19, 22*, 23, 27, 29, 30, 32, 33, 34, 35

11.4: 5, 7, 9*, 13, 16, 17, 19, 25, 29, 31*, 32, 40, 41

• **Due March 4 (Monday):** The above asterisked problems.

• **Extra Credit (4). Due March 5 (Tuesday):** Find all positive values of b for which the series $\sum_{n=1}^{\infty} b^{\ln n}$ converges.

11.5: 4, 7, 9, 12, 14, 17, 20*, 23, 32*, 33, 34

11.6: 2, 4, 5, 11, 15, 17*, 21, 23, 25, 27, 29, 30, 31*, 34, 44

11.7: 5, 7, 8, 13, 17, 19, 21, 23, 25*, 28, 33*, 36

• **Due March 11 (Monday):** The above asterisked problems.

• **Extra Credit (5). Due March 12 (Tuesday):** For which positive integers k is the series $\sum_{n=1}^{\infty} \frac{(n!)^2}{(kn)!}$ convergent?

11.8: 5, 8, 11, 14, 15, 18, 20, 23, 27, 28, 31

11.9: 3, 7, 9, 11, 13, 16, 19, 23, 27, 28, 39

11.10: 5, 10, 13, 15, 17, 20, 25, 27, 31, 35, 38, 48 56, 60, 61, 63, 66, 68

Exam (2) 3/21/2013 (Thursday). Sections: 11.1–11.10

12.1: 7, 9, 11, 13, 16, 17, 20, 40, 41, 43

12.2: 21, 25, 27, 29, 32, 41, 43, 45, 47, 51

12.3: 5, 7, 9, 16, 17, 20, 23, 25, 27, 30, 31, 35, 43, 53, 61

12.4: 3, 5, 7, 16, 19*, 33, 35, 37, 41, 43*, 44, 45

12.5: 7, 10, 12*, 21, 24, 25, 27, 29, 31, 33*, 37, 39, 45, 48, 50, 53*, 55, 60, 63, 65*, 71, 73

12.6: 11, 14, 19, 21–28, 31, 34, 35*, 43, 45*, 46

• **Due April 15 (Monday):** The above asterisked problems.

13.1: 11, 15, 27, 29, 30, 41, 43, 48

13.2: 6, 8, 10, 15, 17, 21, 23, 27, 37, 40, 41, 54

13.3: 3, 4, 13, 17, 24, 25, 31, 32, 49

Exam (3) 4/23/2013 (Tuesday). Sections: 11.10, 12.1–12.6, 13.1–13.3

13.4: 5, 7, 11, 14, 15, 19, 21, 23, 25, 30

14.3: 17, 22, 29, 35, 41, 47, 49, 53, 56, 65, 67, 76, 77, 80, 95

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FINAL EXAM: May 7, 2013 (Tuesday), 5:30–7:30 pm, Lockett 137

Practice Problems

1. Evaluate the integral $\displaystyle\int xe^{-x}\,dx$.
2. Evaluate the integral $\displaystyle\int \frac{1}{(1+x^2)\sqrt{1+x^2}}\,dx$.
3. Evaluate the integral $\displaystyle\int \frac{x-1}{x^2+3}\,dx$.
4. Express $\dfrac{x-2}{x(x^2+1)}$ as a sum of partial fractions.
5. Find the Cartesian equation for the polar curve $r = \sin\theta + 5\cos\theta$.
6. Find the n-th partial sum s_n of the series $\displaystyle\sum_{n=1}^{\infty} \ln\Big(\frac{n+2}{n+1}\Big)$.
7. Find a unit normal vector to the plane that contains the points $P(1,-1,1)$, $Q(0,1,1)$, and $R(-1,-1,2)$.
8. If the angle between two unit vectors $\vec{a}$ and $\vec{b}$ is $\pi/6$, then what is the value of the dot product $\vec{a}\cdot\vec{b}$?
9. Find the unit tangent vector to the curve $\vec{r}(t) = \langle t,\, 2\sin t,\, 2\cos t\rangle$ at the point given by $t = \pi/3$.
10. Let $f(x,y) = \dfrac{x+y}{x-y}$. Find the partial derivative $\dfrac{\partial f}{\partial y}$.
11. Evaluate $\displaystyle\int \frac{1}{\sqrt{x^2-1}}\,dx$.
12. Evaluate $\displaystyle\int \frac{\sin x}{1-\sin^2 x}\,dx$.
13. Evaluate $\displaystyle\int \frac{x^2-x}{(x+1)(x^2+1)}\,dx$.
14. Find the arc length of the polar curve $r = e^{\theta},\ 0 \le \theta \le \ln 3$.
15. State the Maclaurin series of the functions e^x and $\sin x$.
16. Verify that the function $u(t,x) = e^{-k^2 t}\sin(kx)$ satisfies the equation $u_t = u_{xx}$ for any constant k.
17. Find the length of the curve $\vec{r}(t) = \langle \frac{t^2}{2}, \frac{4}{3}t^{\frac{3}{2}}, 2t\rangle,\ 0 \le t \le 4$.
18. Find the radius of convergence of the power series $\sum_{n=1}^{\infty} \frac{(2n)^n}{n!}x^n$.
19. Find the distance from the point $P(1,2)$ to the line $3x - 4y = 5$.
20. Find the curvature of the curve $\vec{r}(t) = \langle \ln\sec t, t, 5\rangle$ at the point where $t = \pi/4$.