Name: ______________________________ **Exam 3**

Math 152, Calculus II – Crawford **29 April 2018**

Score	
1	/10
2	/12
3	/30
4	/12
5	/24
6	/10
7	/6
Total	/100

- Calculators, books, or notes (in any form) are not allowed. Having a phone out will result in an automatic 0 grade.
- You may use the given formula sheet.
- Clearly indicate your answers.
- ***Show all your work*** – partial credit may be given for written work.
- Good Luck!

1. (10 pts). Determine whether the following series converges or diverges. If it converges, find the sum.

$$\sum_{n=1}^{\infty} \frac{4(-2)^{n-2}}{3^{n+1}}$$

2. (12 pts). Given $\sum_{n=1}^{\infty} ne^{-n^2}$,

(a). Use the integral test to show that it converges. [You do not need to show that it decreases.]

(b). If s_{10} is used to approximate the infinite series, what is the bound for the maximum possible error? (i.e. bound on $|R_{10}|$?) [Leave your answer exact.]

3. (30 pts). Determine whether the following series converge or diverge. [Show all your work and clearly indicate any tests that you use.]

(a). $\displaystyle\sum_{n=1}^{\infty}\left(\frac{n-8n^2}{3n^2+2}\right)^n$

(b). $\displaystyle\sum_{n=1}^{\infty}\frac{2+\sin n}{n^2+4}$

(c). $\displaystyle\sum_{n=1}^{\infty}\frac{(-1)^n n!}{n10^n}$

4. (12 pts). Determine whether the following series is absolutely convergent, conditionally convergent, or divergent. [Show all your work and clearly indicate any tests that you use.]

$$\sum_{n=1}^{\infty} \frac{(-1)^n 3n}{n^2+n}$$

5. (24 pts). Find the radius of convergence and *exact* interval of convergence for the following series.

(a). $\displaystyle\sum_{n=1}^{\infty} \frac{n^2(x+1)^n}{2^n}$

(b). $\displaystyle\sum_{n=1}^{\infty} \frac{n!}{n+1} x^{2n}$

6. (10 pts). Use a known power series to find a power series representation for the function $f(x) = \dfrac{x}{(1+4x)^2}$.
[Simplify your answer, but do not shift any indices.]

7. (6 pts). TRUE OR FALSE. Determine whether the following statement is true or false.

(a). T F If $\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$, then $\sum_{n=2}^{\infty} \frac{1}{n^2} = \frac{\pi^2 - 6}{6}$

(b). T F If $\sum_{n=1}^{\infty} c_n x^n$ converges for $x = -3$, but diverges for $x = 4$, then it must converge for $x = 3$.

(c). T F If $\sum_{n=1}^{\infty} c_n x^n$ converges for $x = -3$, but diverges for $x = 4$, then it must diverge for $x = -5$.