Name:______________________________

Math 2924 Section 170 — *Practice Exam 3* — *March 5, 2015*

Follow the instructions for each question and show enough of your work so that I can follow your thought process. If I can't read your work or answer, you will receive little or no credit!

1. Determine if the following series is absolutely convergent, conditionally convergent, or divergent:

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

2. Determine if the following series is absolutely convergent, conditionally convergent, or divergent:

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

3. Find the Taylor series of $f(x) = \sin x$ at $a = \dfrac{\pi}{2}$. Also compute the radius and interval of convergence.

4. Find the Taylor series of $f(x) = \ln x$ at $a = 2$. Also compute the radius and interval of convergence.

5. Find the points on the curve, $x = t^3 - 3t$, $y = t^2 - 3$, where the tangent is horizontal and vertical.

6. Find the points on the curve, $x = e^{\sin t}$, $y = e^{\cos t}$, where the tangent is horizontal and vertical.

7. Compute the length of the curve, $x = t \sin t$, $y = t \cos t$, for $0 \leq t \leq 1$.

8. Compute the length of the curve, $x = 1 + 3t^2$, $y = 4 + 2t^3$, for $0 \leq t \leq 1$.

9. Compute the volume of the parallelpiped determined by the vectors, $\mathbf{a} = \langle 1, 4, -7 \rangle$, $\mathbf{b} = \langle 2, -1, 4 \rangle$, $\mathbf{c} = \langle 0, 9, 18 \rangle$.

10. Compute the volume of the parallelpiped determined by the vectors, $\mathbf{a} = \langle 0, 1, 1 \rangle$, $\mathbf{b} = \langle 1, 1, 0 \rangle$, $\mathbf{c} = \langle 1, 1, 1 \rangle$.

11. Find an equation of the plane though that passes through the points $(3, -1, 2)$, $(8, 2, 4)$ and $(-1, -2, -3)$.

12. Find an equation of the plane that contains the line $\mathbf{r}(t) = \langle 1+t, 2-t, 4-3t \rangle$ and is parallel to the plane $5x + 2y + z = 1$.

13. Taking the value of x^x at 0 to equal 1, show that

$$\int_0^1 x^x \, dx = \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^n}$$