**Math 5B Test 3**
**SAMPLE**
**(11.8-11.11, 10.1, 10.2i)**

**100 POINTS** **NAME:** _____

No scratch paper. Show all work clearly on test paper. No credit will be given for solutions if work is not shown. Only non-graphing calculators are allowed. Unless otherwise specified, the answer to series questions should be given using sigma notation. Unless otherwise stated, you do not need to find the radius of convergence.

(1) FIND THE INTERVAL OF CONVERGENCE FOR EACH OF THE FOLLOWING. (5 points each)

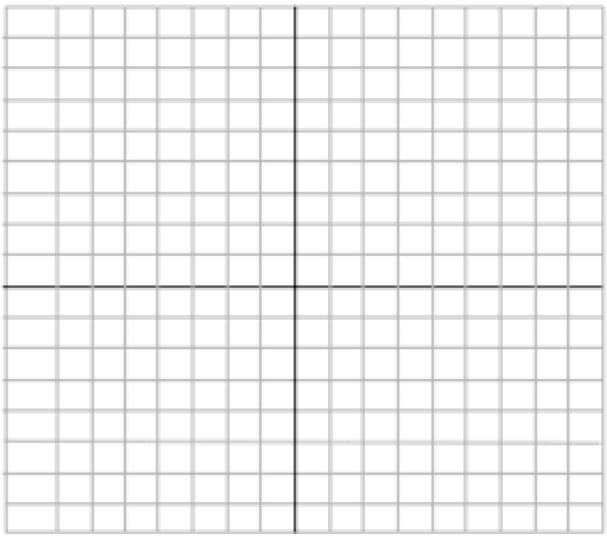
(a) $\sum_{n=1}^{\infty} \frac{2^n (x+3)^n}{\sqrt{n}}$

(b) $\sum_{n=1}^{\infty} \frac{n^2 x^n}{2 \bullet 4 \bullet 6 \bullet \cdots \bullet (2n)}$

(c) $\sum_{n=1}^{\infty} \frac{n!}{3^n} (x+4)^n$

(2) Eliminate the parameter and sketch the curve, showing direction of increasing t . $\begin{cases} x = e^{2t} \\ y = e^{t} \end{cases}$

(10 points)



(3) Find the Maclaurin series for f(x)=cos2x directly, using the definition.

(10 points)

(4) Find the Maclaurin series for $x^4 e^{x^3}$ (5 points)

(There are easy ways and there are hard ways this can be done)

---

(5) Find the Taylor series for $f(x)=1/x^2$ centered at $a=2$. (Assume that f has a power series expansion.

(10 points)

(6) Find the length of the curve $y=x^{2/3}$ from (1,1) to $(2\sqrt{2}, 2)$

(10 points)

---

(7) (10 points)

**24.** Match the parametric equations with the graphs labeled I–VI. Give reasons for your choices. (Do not use a graphing device.)

(a) $x = t^3 - 2t, \quad y = t^2 - t$

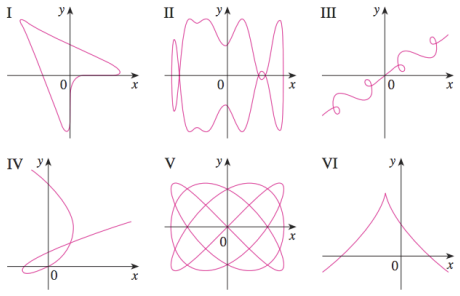
(b) $x = t^3 - 1, \quad y = 2 - t^2$

(c) $x = \sin 3t, \quad y = \sin 4t$

(d) $x = t + \sin 2t, \quad y = t + \sin 3t$

(e) $x = \sin(t + \sin t), \quad y = \cos(t + \cos t)$

(f) $x = \cos t, \quad y = \sin(t + \sin 5t)$



(8) Using the geometric series for $\frac{1}{1-x}$ find a power series representation for $\frac{5x}{1+3x}$ and determine the radius of convergence.

(10 points)

---

(9) Use series to compute $\int_0^{1/2} x^2 e^{-x^2}\,dx$ with |error| < 0.001. (10 points)

(10) (a) Approximate the function $f(x) = x \ln x$ by $T_3(x)$, the third degree Taylor Polynomial centered at a=1.

(b) Use Taylor's Inequality to estimate the accuracy of the approximation when x lies in the interval $0.9 \le x \le 1.1$

(c) Use $T_3(x)$ to approximate (1.01) ln(1.01)

(10 points)