Name (print):

CALCULUS 132:	MISSION 3 (35PTS)

Show work. Your work should be single-sided and clearly labeled. Number the pages in your solution. You will be given a folder to turn in your work, please print your full name in large font on the outside so it is easy for you to pick back up after grading. Thanks.

Recommended Practice Problems: (these are not collected)
Stewart §11.8 #'s 3, 7, 11, 15, 19, 25, 27, 29, 31, 39, 41
Stewart §11.9 #'s 3, 5, 7, 9, 13, 15, 17, 19, 25, 27, 29, 31, 37, 41
Stewart §11.10 #'s 7, 15, 17, 23, 25, 29, 31, 33, 35, 39, 41, 47, 51, 57, 59, 67, 75, 79, 82, 85
Stewart §11.11 #'s 3, 7, 13, 17, 19, 21, 27, 29, 33, 35

Problem 91 Find the IOC and ROC for $f(x) = \sum_{k=1}^{\infty} \frac{3k^2}{e^k} x^k$.

Problem 92 Find the IOC and ROC for $f(x) = \sum_{k=1}^{\infty} \frac{7^k}{k!} x^k$.

Problem 93 Find the IOC and ROC for $f(x) = \sum_{k=1}^{\infty} \frac{k!}{e^k} x^k$.

Problem 94 Find the IOC and ROC for $f(x) = \sum_{k=1}^{\infty} \frac{k^3}{e^k} x^k$.

Problem 95 If $f(x) = \sum_{k=0}^{\infty} \frac{1}{2k+1}(x-3)^k$ then find the IOC and ROC for $f(x)$

Problem 96 Use the geometric series to find a power series in x for $f(x) = \dfrac{x}{3 - x^3}$ and state the IOC for the power series.

Problem 97 Use geometric series techniques to find the power series for $f(x) = \tan^{-1}(7x^3)$ in centered at $x_o = 0$ in Σ notation.

Problem 98 Suppose $f(x) = \sum_{k=0}^{\infty} c_k(x+3)^k$ converges at $x = 0$ and diverges at $x = 5$. Determine the largest and smalllest IOC for $f(x)$.

Problem 99 Find the first three non-trivial terms in the power series centered at $x_o = 0$ for $f(x) = \dfrac{x}{\sqrt{1-x^3}}$

Problem 100 Find the first three non-trivial terms in the power series centered at $x_o = 1$ for $f(x) = (1 + x^2)\sin(x)$

Problem 101 Find the first three non-trivial terms in the power series centered at $x_o = 0$ for f defined by

$$f(x) = \frac{x^2}{1 - e^{3x}} \text{ for } x \neq 0 \text{ and } f(0) = 0.$$

Problem 102 Calculate a power series solution for the indefinite integral $\int x \sin(7x^3)\, dx$

Problem 103 Approximate $\int_0^{0.5} \sin(6x^6)\, dx$ to within an error of 0.00001 by an appropriate application of the alternating series estimation theorem.

Problem 104 Let $f(x) = (x^2 + x^4 + x^6)\sinh(3x) + \cos(x^4) + \dfrac{1}{1-x^2}$. Find $f^{(100)}(0)$.

Problem 105 Let $f(x) = x^2 + \cos(x) + e^x$ find the power series centered at $x = 1$.

Problem 106 Find all x for which $\sum_{n=0}^{\infty}(-1)^n 9^n (x+10)(x-10)$ converges.

Problem 107 Find the Taylor series for $f(x) = \sec(x)$ to order 5 centered at $x = 0$. (you could either use division of the Maclaurin series for cosine or you can calculate the derivatives of secant and apply Talyor's Theorem, I don't expect you to show secant is analytic at zero, that you may assume)

Problem 108 Find the Taylor series for $f(x) = \sqrt{16 + x^4}$ up to order 13. For the sake of common human decency, use the Binomial Series and an appropriate substitution!

Problem 109 Suppose $a > 0$ and consider $f(x) = \ln(1 - ax)$. Use geometric series techniques to find the Maclaurin series for $f(x)$ and determine the IOC for your representation of $f(x)$ centered at $x_o = 0$.

Problem 110 Find the Taylor series expansion for $f(x) = \ln\left(\frac{1+x}{1-x}\right)$.

Problem 111 Find the Taylor series expansion of $f(x) = \frac{1}{x}$ centered at $x_o = a$ for $a \neq 0$. Find the IOC for your expansion.

Problem 112 Find the Taylor series expansion of $f(x) = \sin(\pi x)$ centered at $x_o = 1$.

Problem 113 Expand $g(x) = x\ln(x)$ as a Taylor series centered at $x_o = 2$. Recall we can derive from geometric series techniques the useful result $\ln(1+u) = \displaystyle\sum_{k=0}^{\infty} \frac{(-1)^k}{k+1} u^{k+1}$.

Problem 114 Consider $y'' + y = 0$ given $y(0) = 0$ and $y'(0) = 1$. Assume $y = \sum_{n=0}^{\infty} a_n x^n$ is a solution for the given initial value problem. Find the explicit form of a_n for $n = 0, 1, 2, \ldots$. Can you recognize the result ?

Problem 115 Find the explicit solution of $\dfrac{dy}{dx} = \dfrac{e^{x^2}}{y}$ given that $y(0) = -1$.

Problem 116 Stewart §11.10 # 61

Problem 117 Stewart §11.10 # 62

Problem 118 Stewart §11.10 # 65

Problem 119 Stewart §11.10 # 69

Problem 120 Stewart §11.10 # 71

Problem 121 Stewart §11.10 # 72

Problem 122 Stewart §11.10 # 73

Problem 123 Stewart §11.10 # 77

Problem 124 Stewart §11.10 # 78

Problem 125 Stewart §11.10 # 81