MAT 250 Exam #4A Fall 2004	Choose any 3 of the 4 problems below to work. Cross out the 1 problem you've elected <u>not</u> to do!	Name:

1	**15**	
2	**15**	
3	**15**	
4	**15**	
Total	**60**	

1) Using unit step functions, create an infinite series for the periodic function with domain $t \in (0,\infty)$ whose graph begins as shown…

2) Solve the initial value problem:
$$y'' + 2y' - 3y = \delta(t-1) - \delta(t-2), \quad y(0) = 2, \quad y'(0) = -2$$

3) In the study of a nonlinear spring with periodic forcing, the equation $y'' + ky + ry^3 = A\cos\omega t$ arises. Let $A = k = r = 1$ and $\omega = 8$. Find the first three nonzero terms in the Taylor polynomial approximation to the solution with initial values $y(0) = 0, \quad y'(0) = 1$.

4) Determine the convergence set of the power series $\displaystyle\sum_{n=1}^{\infty} \frac{3^{-n} x^n}{n}$.

MAT 250 Exam #4B Fall 2004	Choose any 3 of the 4 problems below to work. Cross out the 1 problem you've elected **not** to do!	Name:

Prob. Num.	Point Value	Points Given
1	15	
2	15	
3	15	
4	15	
Sub-Total	45	
Grand Total	90	
Curve		
Grade		

1) Find the power series expansion of the form $\sum\limits_{n=0}^{\infty} a_n x^n$ for $f(x) + g(x)$, given that $f(x) = \sum\limits_{n=1}^{\infty} \dfrac{2}{3n-5} x^{n-1}$ and $g(x) = \sum\limits_{n=3}^{\infty} 2^{-n+1} x^{n-3}$.

2) Find a power series expansion about $x = 0$ for a general solution to $y'' - xy' + 4y = 0$.

3) Find at least the first four nonzero terms in a power series expansion about $x = 0$ for the solution to the initial value problem $\left(x^2 - x + 1\right) y'' - y' - y = 0$, $y(0) = 0, \quad y'(0) = 1$.

4) Find a power series expansion for $f'(x)$, given that $f(x) = \sum\limits_{k=0}^{\infty} \dfrac{(-1)^k}{(2k+1)!} x^{2k+1}$.