MATH 251
Final Exam
December 19, 2012

ANSWER KEY

	Form A	Form B
1.	B	A
2.	B	A
3.	C	D
4.	D	B
5.	D	A
6.	A	C
7.	D	B
8.	D	C
9.	C	A
10.	B	C
11.	D	C
12.	A	D
13.	F, T, F, T,	T, F, T, T

14. (a) $\lambda_n = n^2$, $X_n(x) = \sin(nx)$, $n = 1, 2, 3, \ldots$

(b) No, 0 is not an eigenvalue. There is only the trivial solution.

15. (a) --- (b) *ii* (c) --- (d) $\frac{a_0}{2} = 2$

(e) *odd (a)*: $f(18) \to 0$; *even (c)*: $f(18) \to 1$.

16. (a) $u(x,t) = 2e^{-5t/4}\sin(\frac{x}{2}) + 30e^{-20t}\sin(2x) - 60e^{-45t}\sin(3x)$

(b) $\lim_{t\to\infty} u(\pi,t) = 0$ (c) $v(x) = 0$

(d) There will be no difference. Regardless of the initial condition, the limit will converge to $v(x) = 0$.

17. (a) Initial displacement/position (b) Initial velocity

[Form A] (c) *iii* (d) False (e) No

[Form B] (c) *ii* (d) True (e) No