MTH 264, Quiz #10, Fall 2022 Name KEY

Instructions: Work the problems below as directed. Show all work. Clearly mark your final answers. Use exact values unless the problem specifically directs you to round. Simplify as much as possible. Partial credit is possible, but solutions without work will not receive full credit.

1. Find the nth Taylor polynomial centered at the given c. Use the included table to show work.
   a. $f(x)=e^{-x}, n=4, c=0$

n	n!	$f^{(n)}(x)$	$f^{(n)}(c)$	$(x-c)^n$	$\frac{f^{(n)}(c)}{n!}(x-c)^n$
0	1	e^{-x}	1	1	$1/1$
1	1	$-e^{-x}$	-1	x	$-x/1$
2	2	e^{-x}	1	x^2	$x^2/2$
3	6	$-e^{-x}$	-1	x^3	$-x^3/6$
4	24	e^{-x}	1	x^4	$x^4/24$
5	120				
6	720				

$P_n(x) = 1 - x + \frac{x^2}{2} - \frac{1}{6}x^3 + \frac{1}{24}x^4$

2. Using the attached table of Power Functions, find the power function for the given functions and integrate the first 3 terms.

$$s(x) = e^x \sin x$$

$e^x = 1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 + \ldots$

$\sin x = x - \frac{x^3}{6} + \frac{x^5}{120} - \ldots$

$(1 + x + \frac{1}{2}x^2 + \frac{1}{6}x^3 \ldots)(x - \frac{x^3}{6} + \frac{x^5}{120} \ldots) = x - \frac{x^3}{6} \ldots + x^2 - \frac{x^4}{6} \ldots + \frac{1}{2}x^3 - \frac{x^5}{12} \ldots$
$+ \frac{1}{6}x^4 - \frac{x^6}{36} + \ldots$

$x + x^2 + \frac{1}{3}x^3 + \ldots$

$\int e^x \sin x\, dx \approx \int x + x^2 + \frac{1}{3}x^3\, dx = \frac{1}{2}x^2 + \frac{1}{3}x^3 + \frac{1}{12}x^4$