

Take Home Exam 1

Due Date:

Name _____

Wed. July, 15 4:30 pm

1. Find the first $f'(x)$ derivative of the function $f(x)$ (Show your work!):

a. $f(x) = x \sin(x)$

b. $f(x) = 2x^2 \sin(3x)$

c. $f(x) = a\sqrt{x} \cos(bx)$, $a = \text{const}$, $b = \text{const}$

2. Find the first $f'(x)$ and SECOND $f''(x)$ derivatives of the function $f(x)$ (Show your work!):

a. $f(x) = x^8$

b. $f(x) = e^{-5x} + \sin(2x) - x^8$

c. $f(x) = 2 \sin(2x) - 3 \cos(2x)$

3. Evaluate the following integral: $\int_0^{\pi/3} 3 \sin(3x) dx$ (Show your work!)

4 Given the wavefunction: $\Psi(x) = 3e^{-3x}$, evaluate the following integral: $\int_0^{\infty} \Psi^2(x) dx$
(Show your work!)

5. Evaluate the following integral: $\frac{2}{3} \int_0^3 \sin^2\left(\frac{\pi x}{3}\right) dx$ (Show your work!)

Hint: $\sin^2(x) = \frac{1}{2}(1 - \cos(2x))$