

Problem Set 1

Physics 221

Due October 8

Some abbreviations: B - Boas.

The aim of this first problem set is to make sure everyone is up to speed on complex numbers and vectors. There is also a series of drills on calculus. We have found that many of you can grasp the conceptual issues but make mistakes on basic calculus. The best way to avoid this is by drills. Make sure you do these drills on your own.

Be sure you have the third edition of the textbook and feel free to do more exercises!

1. B. p.52 #10
2. B. p.54 #48
3. B. p.88 #18
4. B. p.95 #5 & #10
5. B. p.96 #17
6. B. p.105 #12 & #18 & #23
7. B. p.121 #1
8. B. p.122 #6 & #15

Compute the following derivatives or integrals. The parameters a, b are constants.

9. $\frac{\partial}{\partial x}(x^5)$, $\frac{\partial}{\partial x}(x^6)$, $\frac{\partial}{\partial x}(e^{ax})$, $\frac{\partial}{\partial x}(x^4 e^{x^3})$, $\frac{\partial}{\partial x}(\sin(x))$, $\frac{\partial}{\partial x}(\cos(x))$, $\frac{\partial}{\partial x}(\sin(3x))$, $\frac{\partial}{\partial x}(\cos(ax))$.
10. $\frac{\partial}{\partial x}(\cos(ax) \sin(bx))$, $\frac{\partial}{\partial x}(\cos^2(ax) \sin(bx))$, $\frac{\partial}{\partial x}(\frac{1}{x})$, $\frac{\partial}{\partial x}(\frac{1}{x^6})$, $\frac{\partial}{\partial x}(\frac{1}{x^a})$, $\frac{\partial}{\partial x}(\log(x))$, $\frac{\partial}{\partial x}(x^2 \log(ax + b))$, $\frac{\partial}{\partial x}(\frac{e^{2x^2}}{x^9})$.
11. $\int \cos(x)$, $\int \sin(5x)$, $\int \cos(8x)$, $\int \sin(3xy)dx$, $\int x^2$, $\int x^3$, $\int x^{15}$, $\int \frac{1}{x}$, $\int \frac{1}{x^3}$, $\int \frac{1}{x^8}$.
12. $\int \log(x)$, $\int e^{2x}$, $\int e^{15x}$, $\int e^{xy^3} dx$, $\int e^{ax}$, $\int e^{-7x}$, $\int e^x \sin(x)$, $\int e^{ax} \cos(x)$.