You may find it helpful to refer to a Calculus book for the on the differentiation rules and integration techniques.

1. Differentiate the following. Don't forget the chain rule, when needed.   [Do not simplify.]

(a). $s(t) = 8t^2 - 4t + 1$ **(b).** $y = \sin \omega t$ **(c).** $y = te^{3t}$

(d). $f(x) = \dfrac{\sqrt{x^2 + 1}}{2x^3 - 1}$

2. Integrate the following using the stated rule or technique. You must show all your work.

(a). $\displaystyle\int t^2 - 3 \, dt$ [power rule]   **(b).** $\displaystyle\int \sec^2 x \, dx$ [trig rule]

(c). $\displaystyle\int x\sqrt{x^2 + 1} \, dx$ [u-subs.]   **(d).** $\displaystyle\int xe^{-4x} \, dx$ [integration by parts]

(e). $\displaystyle\int \dfrac{1}{x^2 + 9} \, dx$ [trig. subs.]   **(f).** $\displaystyle\int \dfrac{x - 1}{x^2 + 3x + 2} \, dx$ [partial fractions]

3. Integrate the following integrals. Show all your work.

(a). $\displaystyle\int \frac{1}{3x-4}\,dx$

(b). $\displaystyle\int \sin 2x\,dx$

(c). $\displaystyle\int x^2 \cos x\,dx$

(d). $\displaystyle\int \frac{x+1}{\sqrt{4x^2+8x}}\,dx$

(e). $\displaystyle\int \ln x\,dx$

(f). $\displaystyle\int \tan^2 x\,dx$

Additional Homework: Section 1.3, p. 22: #1, 4, 5, 7, 10, 12, 14, 16, 18, 19(u1 only)