

## Worksheet 22: Monday 11/27

**Acknowledgment:** This worksheet has been adapted from that of Gabriel Beiner, a current GSI.

**Key Points:**

After 11/27 Monday's lecture, you should be able to:

- Compute indefinite integrals
- Apply  $u$ -substitution to assist in integral computations
- Understand and compute net changes

**Exercises:**

1. (a)  $\int (x^{1.3} + 7x^{2.5}) dx$

(b)  $\int \frac{1 + \sqrt{y} + y}{y} dy$

(c)  $\int \left(\frac{1+r}{r}\right)^2 dr$

(d)  $\int (\sin(s) + e^{3s}) ds$

2. Suppose oil leaks out of a barrel at a rate of  $r(t)$  gallons per minute at time  $t$ . What does  $\int_0^{120} r(t) dt$  represent?

3. A 4 metre long rod has linear mass density  $\rho(x) = 9 + 2\sqrt{x}$  a distance  $x$  from the left end of the rod. What is the total mass of the rod?

4. Use the given  $u$  substitutions (or find one yourself) to compute these indefinite integrals,

(a)  $\int \sqrt{2t+1} dt, \quad u = 2t+1$

(b)  $\int \sin^2 \theta \cos \theta d\theta, \quad u = \sin \theta$

(c)  $\int x e^{-x^2} dx, \quad u = -x^2$

(d)  $\int 5^y \sin(5^y) dy$

(e)  $\int e^s \sqrt{1+e^s} ds$

(f)  $\int \sec^2(v) \tan^3(v) dv$