

Name: .....

For each of the following problems, say whether you would use:

- (a) substitution (provide  $w$  and write down the indefinite integral with respect to  $w$ )
- (b) integration by parts (give  $u, v', u', v$  and the indefinite integral:  $\int uv' dx = uv - \int u'v dx$ )

You do not need to calculate the anti-derivative.

- 1.  $\int t(t - 10)^{10} dt$
- 2.  $\int (\ln(x))^2 dx$
- 3.  $\int \frac{\cos(\sqrt{y})}{\sqrt{y}} dy$

**Solution:**

- 1. (a)  $w = t - 10, dw = dt, \int t(t - 10)^{10} dt = \int (w + 10)w^{10} dw = \int (w^{11} + 10w^{10}) dw$  [or by parts]
- 2. (b)  $u = (\ln(x))^2, v' = 1, u' = \frac{2\ln(x)}{x}, v = x, \int (\ln(x))^2 dx = x(\ln(x))^2 - 2 \int \ln(x) dx$  [and again by parts]
- 3. (a)  $w = \sqrt{y}, dw = \frac{1}{2}y^{-1/2} dy, \int \frac{\cos(\sqrt{y})}{\sqrt{y}} dy = 2 \int \cos(w) dw$