1. We have that:

$$\int_{-1}^{1} e^{u+1}du = \int_{-1}^{1} e^{u}e^{1}du = e^{1}\int_{-1}^{1} e^{u}du$$

This is why the integral evaluates to

$$e^{u+1}|_{-1}^{1} = e^2 - e^0 = e^2 - 1$$

Note: you can also make a substituion, letting $r = u + 1$, and get the same answer.

2. This question requires that you make the substitution

$$u = \frac{1}{x}, du = -\frac{1}{x^2}dx$$

With this, we now need to evaluate

$$\int_{1}^{1/2} -e^{u}du = \int_{1/2}^{1} e^{u}du = e^{u}|_{1/2}^{1} = e^{1} - e^{1/2}$$

3. Note that the distance is given by

$$\int_{0}^{3} |v(t)|dt$$

While the displacement is given by

$$\int_{0}^{3} v(t)dt$$

For distance, we need to find when $v(t) < 0$ and $v(t) > 0$. By solving either inequality, we see that $v(t) < 0 \iff t < \frac{5}{3}$
Therefore, the integral giving distance is

$$\int_{0}^{3} |v(t)|dt = \int_{0}^{5/3} (-3t+5)\,dt + \int_{5/3}^{3} (3t-5)\,dt$$

Evaluating this, we get

$$\left[-\frac{3}{2}t^2 + 5t\right]_{0}^{5/3} + \left[\frac{3}{2}t^2 - 5t\right]_{5/3}^{3} = -\frac{3}{2}\left(\frac{5}{3}\right)^2 + 5\frac{5}{3} + \frac{3}{2}(3)^2 - 5(3) - \frac{3}{2}\left(\frac{5}{3}\right)^2 + 5\frac{5}{3} = \frac{41}{6}$$

The displacement is given simply by

$$\int_0^3 (3t-5)\,dt = \left[\frac{3}{2}t^2 - 5t\right]_0^3 = \frac{3}{2}(3)^2 - 5(3) = -\frac{3}{2}$$

Note: Displacement is given by $\int |v(t)| dt$, and not $|\int v(t) dt|$. If you think about what what the absolute value sign does, you can see that the "reflects" negative-valued portions of the graph about $y = 0$, which will give you the total distance travelled, while the second gives the absolute value of the displacement.