These are alleged answers. For each error herein, you get extra-credit points for being the first to report it by e-mail.

1. A “parts” solution:

<table>
<thead>
<tr>
<th>$u(x) = x$</th>
<th>$v'(x) = \cos(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$u'(x) = 1$</td>
<td>$v(x) = \sin(x)$</td>
</tr>
</tbody>
</table>

So that the formula

$$\int u(x)v'(x) \, dx = u(x)v(x) - \int u'(x)v(x) \, dx$$

works out as follows:

$$\int x \cos(x) \, dx = x(\sin(x)) - \int \sin(x) \, dx$$  

$$= x \sin(x) + \cos(x) + C$$

2. $\int_{-\pi/2}^{\pi/2} x \cos(x) \, dx = 0$, either by plug-and-chug, or by noticing that the integrand is an odd function and the interval of integration is symmetric about zero.

3. $\int_{\pi/3}^{\pi} x \cos(x) \, dx = -\frac{9 + \pi \sqrt{3}}{6}$