1. **A** To find the left Riemann sum we'll start evaluating the rectangles at the left-endpoints whuch are 0, 3, 4, 5 and 8.

$$\int_0^{10} C(t)dt = C(0)\cdot 3 + C(3)\cdot 1 + C(4)\cdot 1 + C(5)\cdot 3 + C(8)\cdot 2 = 510 \text{ thousands of units}$$

   B Because the function C(t) is decreasing over the interval then the left Riemann sum is an overestimate.

2. **A** On the interval [2, -5] there's one half of the semi circle and a line segment.

$$\int_{-5}^{2} f(x)dx = -\frac{9\pi}{4} - 12 - \frac{2\cdot 1}{2} + \frac{2\cdot 1}{2} = -12 - \frac{9}{4}\pi$$

   B We'll use the simple integration rules to solve this one

$$\int_0^6 [g(x)+2]dx = \int_{-5}^{6} g(x)dx - \int_{-5}^{0} g(x)dx + \int_0^6 2dx = 32$$

   C We'll solve this similarily as the two previous problems.

$$\int_0^6 [3g(x) - f(x)]dx = 3\int_0^6 g(x)dx - \int_0^6 f(x)dx = 60 - 17 - 4\pi = 43 - 4\pi$$

3. **A**

$$\int tan^3(x)sec^2(x)dx \text{ let } u = tan(x) \Rightarrow dx = \frac{du}{sec^2(x)}$$
$$\int u^3du = \frac{u^4}{4} + C = \frac{tan^4(x)}{4} + C$$

   B

$$\int e^{cos(x)}sin(x)dx \text{ let } u = cos(x) \Rightarrow dx = -\frac{du}{sin(x)}$$
$$-\int e^u du = -e^u + C = -e^{cos(x)} + C$$

   C

$$\int \frac{x}{\sqrt{1-16x^2}}dx \text{ let } u = 1 - 16x^2 \Rightarrow dx = -\frac{du}{32x}$$
$$-\frac{1}{32}\int \frac{1}{\sqrt{u}}du = -\frac{1}{16}\sqrt{u} + C = -\frac{1}{16}\sqrt{1-16x^2} + C$$

4. **A** There are two possible ways of writing this Riemann sum as an definite integral.

   1. $\int_0^4 \sqrt{2+x}dx$
   2. $\int_2^6 \sqrt{x}dx$

   B The integrals above will give the same value so it doesn't not matter which one we will evaluate.

$$\int_0^6 \sqrt{x}dx = [\frac{2}{3}x^{3/2}]_0^6 = 4\sqrt{6} - \frac{4\sqrt{2}}{3}$$

5. We'll solve this by following the integration rules.

$$\int_0^{\pi/2} sec^2(x/k)dx = k$$
$$k[tan(x/k)]_0^{\pi/2} = k$$
$$[tan(x/k)]_0^{\pi/2} = 1$$
$$tan(\frac{\pi/2}{k}) - tan(\frac{0}{k}) = 1$$
$$tan(\frac{\pi/2}{k}) = 1$$
$$\frac{\pi/2}{k} = \pi/4 + n\pi \text{ where } n \in Z$$
$$k = 2$$