Integration

1. a) $\int\limits_{0}^{2}(\frac{1}{2}x+4)^3\mathrm{d}x = 184.5$

   b) $\int\limits_{1}^{4}x\sqrt{x}\mathrm{d}x = 12.4$

2. a) $\int\limits_{-1}^{1} -2\mathrm{d}x = -2x|_{x=-1}^{1} = -4$. The area is thus $|-4| = 4$

   b) Zeros: $x_1 = -4; x_2 = -1$
   $$\int\limits_{-4}^{-1} x^2 + 5x + 4\mathrm{d}x = \frac{1}{3}x^3 + \frac{5}{2}x^2 + 4x\Big|_{x=-4}^{-1} = -\frac{9}{2}.$$ The area is thus $\frac{9}{2}$

3. The graphs intersect at $x_1 = -1; x_2 = 3$
   $\forall x \in (-1; 3) \Leftrightarrow g(x) > h(x)$
   $$\Rightarrow \int\limits_{-1}^{3} g(x) - h(x)\mathrm{d}x = \int\limits_{-1}^{3} -x^2 + 2x + 3\mathrm{d}x = \frac{32}{3} \approx 10,67$$