

1) a) $F(x) = \int (x+2)^{-\frac{1}{2}} dx = 2(x+2)^{\frac{1}{2}} + c = 2\sqrt{x+2} + c$
 $F(0) = 2\sqrt{2} + c = 0$ Dus $c = -2\sqrt{2}$

b) $F(x) = \int (x + \frac{1}{x}) dx = \frac{1}{2}x^2 + \ln|x| + c$
 $F(1) = \frac{1}{2} + 0 + c = 3$ dus $c = 2\frac{1}{2}$

c) $F(x) = \int \frac{x^2 - x - 6}{x^2} dx = \int (1 - \frac{1}{x} - \frac{6}{x^2}) dx = x - \ln|x| + \frac{6}{x} + c$
 $F(1) = 1 - 0 + 6 + c = 2$ dus $c = -5$.

2) a) $\int x \sin(x) dx = -x \cos x - \int 1 \cdot (-\cos x) dx = -x \cos x + \sin x + c$

b) $\int x e^{2x} dx = \frac{1}{2} x e^{2x} - \int 1 \cdot \frac{1}{2} e^{2x} dx = \frac{1}{2} x e^{2x} - \frac{1}{4} e^{2x} + c$

c) $\int x^{-\frac{1}{2}} \ln x dx = -2x^{-\frac{1}{2}} \ln x - \int (-2x^{-\frac{1}{2}}) \frac{1}{x} dx =$
 $= -2x^{-\frac{1}{2}} \ln x - 4x^{-\frac{1}{2}} + c = \frac{-2 \ln x}{\sqrt{x}} - \frac{4}{\sqrt{x}} + c$

3) a) $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$ $\frac{u=\sqrt{x}}{du=\frac{dx}{2\sqrt{x}}} \quad 2 \int \frac{e^u}{u} du = 2e^u + c = 2e^{\sqrt{x}} + c$

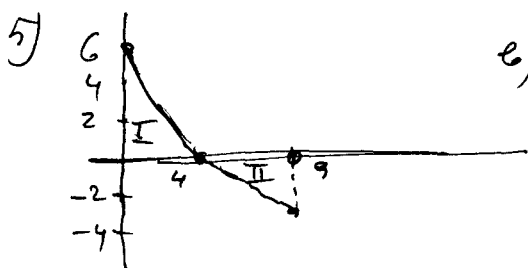
b) $\int \frac{x}{(4x^2+7)^6} dx$ $\frac{u=4x^2+7}{du=8x dx} \quad \frac{1}{8} \int \frac{du}{u^6} = \frac{1}{8} \int u^{-6} du =$

c) $\int \frac{\cos(3x)}{5+2\sin(3x)} dx$ $\frac{u=5+2\sin(3x)}{du=6\cos(3x) dx}$
 $= \frac{1}{6} \int \frac{du}{u} = \frac{1}{6} \ln|u| + c = \frac{1}{6} \ln[5+2\sin(3x)] + c$

4) a) $f'(x) = \cos(x^2)$ dus $f'(\sqrt{\pi}) = \cos(\pi) = -1$

b) $\int_0^{e^2} \ln(x) dx = \lim_{a \downarrow 0} \int_a^{e^2} \ln(x) dx = \lim_{a \downarrow 0} [x \ln x - x]_a^{e^2} =$
 $\lim_{a \downarrow 0} ((e^2 \ln e^2 - e^2) - (a \ln a - a)) = 2e^2 - e^2 = e^2$

c) $\int_0^1 \frac{e^x - 1}{e^x} dx = \int_0^1 (e^x - \frac{1}{e^x}) dx = \int_0^1 (e^x - e^{-x}) dx = [e^x + e^{-x}]_0^1 =$
 $(e^1 + e^{-1}) - (e^0 + e^0) = e + \frac{1}{e} - 2$.



e) opp I = $\int_0^4 (6 - 3\sqrt{x}) dx = [6x - 2x^{1/2}]_0^4 =$
 $= (24 - 2 \cdot 4^{1/2}) - 0 = 24 - 2 \cdot 2 = 8$.

opp II = $[6x + 2x^{1/2}]_4^9 =$
 $(-54 + 2 \cdot 9^{1/2}) - (-24 + 2 \cdot 4^{1/2}) = 0 - (-8) = 8$.

