תרגיל 8 - חדווה

$\int$

(1) (1) $\int x^8\,dx =$

$\frac{x^9}{9}+c$

(2) $\int \sqrt{x}\,dx =$

$x^{\frac{1}{2}} =$

$\frac{x^{\frac{3}{2}}}{\frac{3}{2}} = \frac{x^{1.5}}{1.5}+c = \frac{2}{3}\sqrt{x^3}+c$

(3) $\int (3x^2-\sqrt{5x}+2)\,dx =$

$\int (3x^2-5x^{\frac{1}{2}}+2)\,dx =$

$\frac{3x^3}{3}-5x^{1.5}+2x+c =$

$= x^3-5x^{1.5}+2x+c$

$x^3-\sqrt{5x^3}+2x+c$

(4) $\int \sqrt[3]{x^2}\,dx =$

$\int x^{\frac{2}{3}}\,dx =$

$\frac{x^{\frac{5}{3}}}{\frac{5}{3}}+c = x^{\frac{5}{3}}\cdot\frac{3}{5}+c = \frac{3}{5}x^{\frac{5}{3}}+c$

(5) $\int \frac{1}{x^6}\,dx =$

$\int x^{-6}\,dx =$

$\frac{x^{-5}}{-5}+c = \frac{1}{-5x^5}+c$

(6) $\int (x^3-2x^2)\left(\frac{1}{x}-5\right)dx = \int (x^2-5x^3-2x+10x^2)\,dx =$

$\int (-5x^3+11x^2-2x)\,dx =$

$-5\int x^3\,dx+11\int x^2\,dx-2\int x\,dx =$

$\frac{-5x^4}{4}+\frac{11x^3}{3}-\frac{2x^2}{2}+c$

$\int [3\sin x - 2\sec^2 x]\,dx =$

$\int [3\sin x - 2\frac{1}{\cos^2 x}]\,dx =$

$3\int \sin x - 2\int \frac{1}{\cos^2 x} =$

$3\cos x - 2\tan x$

(10)

$\int \left[\frac{10}{y^{\frac{3}{4}}} - \sqrt[3]{y} + \frac{4}{\sqrt{y}}\right] dy =$ (7)

$\int \left[10 \cdot y^{-\frac{3}{4}} - y^{\frac{1}{3}} + 4 \cdot y^{-\frac{1}{2}}\right] dy =$

$\int \left[10y^{-\frac{3}{4}} - y^{\frac{1}{3}} + 4y^{-\frac{1}{2}}\right] dy =$

$\frac{10y^{\frac{1}{4}}}{\frac{1}{4}} - \frac{y^{\frac{2}{3}}}{\frac{2}{3}} + \frac{4y^{\frac{1}{2}}}{\frac{1}{2}} =$

$10y^{\frac{1}{4}} \cdot 4 - y^{\frac{2}{3}} \cdot \frac{3}{2} + 4y^{\frac{1}{2}} \cdot 2 =$

$40y^{\frac{1}{4}} - \frac{3}{2}y^{\frac{2}{3}} + 8y^{\frac{1}{2}} + C$

$\int x^{\frac{1}{3}}(2-x)^2\,dx =$ (8)

$\int x^{\frac{1}{3}}(4-4x+x^2)\,dx =$

$\int (4x^{\frac{1}{3}} - 4x^{\frac{4}{3}} + x^{\frac{7}{3}})\,dx =$

$4 \cdot \frac{3x^{\frac{4}{3}}}{4} - 4 \cdot \frac{3}{7}x^{\frac{7}{3}} + \frac{3}{10}x^{\frac{10}{3}} + C$

$3x^{\frac{4}{3}} - \frac{12x^{\frac{7}{3}}}{7} + \frac{3x^{\frac{10}{3}}}{10} + C$

(11)

$\int \frac{\sin x}{\cos^2 x}\,dx =$

$u = \cos x$

$du = -\sin x\,dx$

$\int (\frac{-1}{\cos^2 x})(-\sin x)\,dx$

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

$-\int u^{-2}\,du =$

$\frac{-u^{-1}}{-1} + C = u^{-1} + C =$

הצבה

$(\cos x)^{-1} + C =$

$\frac{1}{\cos x} + C$

$\int \frac{x^5 + 2x^2 - 1}{x^4}\,dx =$ (9)

$\int (x^5 + 2x^2 - 1)\,x^{-4}\,dx =$

$\int x + 2x^{-2} - x^{-4}\,dx =$

$\frac{x^2}{2} + \frac{2x^{-1}}{-1} - \frac{x^{-3}}{-3} =$

$\frac{x^2}{2} - \frac{2}{x} + \frac{x^{-3}}{3} =$

$\frac{x^2}{2} - \frac{2}{x} + \frac{1}{3x^3} + C$

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(3)

$$\int 3x^2 (x^3+4)^5 \, dx =$$

$u = x^3+4$

$du = 3x^2 \, dx$

$dx = \frac{du}{3x^2}$

$$\int 3x^2 \cdot u^5 \frac{du}{3x^2} =$$

$$\int u^5 \cdot du = \frac{u^6}{6} + c =$$

$$\frac{(x^3+4)^6}{6} + c$$

(4)

$$\int \sqrt{4x-5} \, dx =$$

$u = 4x-5$

$du = 4 \, dx$

$dx = \frac{du}{4}$

$$\int \sqrt{u} \frac{du}{4} =$$

$$\frac{1}{4} \int u^{\frac{1}{2}} du =$$

$$\frac{1}{4} \cdot \frac{u^{\frac{3}{2}}}{\frac{3}{2}} = \frac{1}{4} \cdot \frac{2}{3} u^{\frac{3}{2}} =$$

$$\frac{(4x-5)^{\frac{3}{2}}}{6} + c$$

(5)

$$\int x^2 (x^3-4)^{-\frac{1}{2}} dx =$$

$u = x^3-4$

$du = 3x^2 \, dx$

$dx = \frac{du}{3x^2}$

$$\int \cancel{x^2} u^{-\frac{1}{2}} \frac{du}{3\cancel{x^2}} =$$

$$\frac{1}{3} \int u^{-\frac{1}{2}} du = \frac{1}{3} \cdot \frac{u^{\frac{1}{2}}}{\frac{1}{2}} = \frac{2}{3} \cdot u^{\frac{1}{2}} + c =$$

$$\frac{2(x^3-4)^{\frac{1}{2}}}{3} + c$$

(7) (2)

$$\int \frac{2x^4}{x^5+1} dx =$$

$u = x^5+1$

$du = 5x^4 \, dx$

$$\int \frac{2}{5} \cdot \frac{5x^4}{x^5+1} dx = \frac{2}{5} \int \frac{5x^4}{x^5+1} dx = \frac{2}{5} \int \frac{1}{u} du =$$

$$\frac{2}{5} \int u^{-1} du = \frac{2}{5} \int \ln|u| + c =$$

$$\frac{2}{5} \ln|x^5+1| + c$$

(1)

$$\int (2x+6)^5 \, dx =$$

$u = 2x+6$

$du = 2 \, dx$ $\quad dx = \frac{du}{2}$

$$\int u^5 \frac{du}{2} = \frac{1}{2} \int u^5 \, du =$$

$$\frac{1}{2} \cdot \frac{u^6}{6} + c = \frac{1}{2} \cdot \frac{(2x+6)^6}{6} + c =$$

$$\frac{(2x+6)^6}{12} + c$$

3)

(2)

$$\int (5x+4)^5 dx =$$

$u = 5x+4$

$du = 5 \, dx$ $\quad dx = \frac{du}{5}$

$$\int u^5 \frac{du}{5} = \frac{1}{5} \int u^5 \, du =$$

$$\frac{1}{5} \cdot \frac{u^6}{6} + c = \frac{1}{5} \cdot \frac{(5x+4)^6}{6} + c$$

$$\frac{(5x+4)^6}{30} + c$$

$$\int \sin^{10} x \cos x \, dx = \quad (10)$$

$u = \sin x$

$du = \cos x \, dx$

$dx = \frac{du}{\cos x}$

$$\int u^{10} \cdot \cos x \cdot \frac{du}{\cos x} =$$

$$\int u^{10} \cdot du = \frac{u^{11}}{11} + c =$$

$$\frac{\sin^{11} x}{11} + c$$

$$\int \frac{\sin x}{(\cos x)^5} dx = \quad (11)$$

$u = \cos x$

$du = -\sin x \, dx$

$dx = \frac{du}{-\sin x}$

$$\int \frac{\sin x}{u^5} \cdot \frac{du}{-\sin x} =$$

$$\int u^{-5} du = -\frac{u^{-4}}{-4} + c =$$

$$\frac{(\cos x)^{-4}}{4} + c$$

$$\int (x+1)((x-2)^9) \, dx = \quad (12)$$

$$\int (x-2+3)((x-2)^9) \, dx =$$

$$\int ((x-2)^{10}) + 3((x-2)^9) \, dx =$$

$u = x-2$

$du = 1 \, dx$

$du = dx$

$$\int 3(u^9) + u^{10} du =$$

$$\frac{3u^{10}}{10} + \frac{u^{11}}{11} + C = \frac{3(x-2)^{10}}{10} + \frac{(x-2)^{11}}{11} + c$$

$$\int [(x-1)^5 + 3(x-1)^2] \, dx = \quad (6)$$

$u = x-1$

$du = 1 \, dx$

$du = dx$

$$\int [u^5 + 3u^2] \, du = \frac{u^6}{6} + \frac{3u^3}{3} =$$

$$\frac{u^6}{6} + u^3 + c =$$

$$\frac{(x-1)^6}{6} + (x-1)^3 + c$$

$$\int \frac{10x^3 - 5x}{\sqrt{x^4 - x^2 - 6}} dx = \quad (9)$$

$u = x^4 - x^2 + 6$

$du = 4x^3 - 2x \, dx$

$dx = \frac{du}{4x^3 - 2x} = \frac{du}{2x(2x^2-1)}$

$$\int \frac{5x(2x^2-1)}{\sqrt{u}} \cdot \frac{du}{2x(2x^2-1)} =$$

$$\int \frac{5x}{\sqrt{u}} \cdot \frac{du}{2x} = \frac{5}{2} \int u^{-\frac{1}{2}} \cdot du =$$

$$\frac{5}{2} \cdot \frac{u^{\frac{1}{2}}}{\frac{1}{2}} + c = \frac{5}{2} \cdot 2u^{\frac{1}{2}} + c =$$

$$5(x^4 - x^2 + 6)^{\frac{1}{2}} + c$$

$$\int \cos(2x+1) \, dx = \quad (8)$$

$u = 2x+1$

$du = 2 \, dx$

$dx = \frac{du}{2}$

$$\int \cos u \, \frac{du}{2} = \frac{1}{2} \int \cos u \, du =$$

$$\frac{1}{2} \sin(2x+1) + c$$

$$\int x\sqrt{1-x}\,dx = \quad f(x)=x \quad g(x)=\sqrt{1-x} \quad (1)$$

$$f'(x)=1 \qquad g(x)=\int\sqrt{1-x}\,dx$$

$u=1-x$

$du=1\,dx$

$du=dx$

נבצע קודם את הצבה:

$$\int\sqrt{u}\,du = \frac{u^{\frac{3}{2}}}{\frac{3}{2}} = \frac{2}{3}u^{\frac{3}{2}} =$$

$$\frac{2\sqrt{(1-x)^3}}{3} + C$$

נציב את התוצאה בנוסחת אינטגרציה בחלקים:

$$\int(x\sqrt{1-x})\,dx = x\cdot\frac{2}{3}\sqrt{(1-x)^3} - \int 1\cdot\frac{2}{3}\sqrt{(1-x)^3}\,dx$$

נחשב את האינטגרל

$$\int\frac{2\sqrt{(1-x)^3}}{3}\,dx = \frac{2}{3}\int\sqrt{(1-x)^3}\,dx =$$

$$\frac{2}{3}\int(1-x)^{\frac{3}{2}}\,dx$$

נבצע שוב את ההצבה:

$u=1-x$

$du=1\cdot dx$

$$\frac{2}{3}\int u^{\frac{3}{2}}\,du = \frac{2}{3}\cdot\frac{u^{\frac{5}{2}}}{\frac{5}{2}} = \frac{2}{3}\cdot\frac{2}{5}u^{\frac{5}{2}} =$$

$$\frac{4}{15}(1-x)^{\frac{5}{2}} + C = \frac{4}{15}\sqrt{(1-x)^5} + C$$

נציב חזרה את פתרון האינטגרל בנוסחה:

$$\int x\sqrt{1-x}\,dx = \frac{2x\sqrt{(1-x)^3}}{3} - \frac{4\sqrt{(1-x)^5}}{5} + C$$

$$\int(2x+3)\sqrt{2x-1}\,dx \quad (13)$$

$$\int(2x-1+4)(2x-1)^{\frac{1}{2}}\,dx$$

$u=2x-1$

$du=2\,dx$

$dx=\frac{du}{2}$

$$\int(u+4)(u)^{\frac{1}{2}}\frac{du}{2} =$$

$$\frac{1}{2}\int u^{\frac{3}{2}}+4u^{\frac{1}{2}}\,du =$$

$$\frac{1}{2}\cdot\frac{u^{\frac{5}{2}}}{\frac{5}{2}} + \frac{4u^{\frac{3}{2}}}{\frac{3}{2}} + C =$$

$$\frac{1}{2}\left(\frac{2u^{\frac{5}{2}}}{5} + \frac{8u^{\frac{3}{2}}}{3} + C\right) =$$

$$\frac{u^{\frac{5}{2}}}{5} + \frac{8u^{\frac{3}{2}}}{6} + C =$$

$$\frac{(2x-1)^{\frac{5}{2}}}{5} + \frac{8(2x-1)^{\frac{3}{2}}}{6} + C$$

$$\int \underbrace{x}_{g}\,\underbrace{\sin(3x)}_{f}\,dx = \quad (3) \quad (3)$$

$$f'(x)=\sin(3x) \qquad f(x)=\frac{-\cos(3x)}{3}$$

$$g(x)=x \qquad g'(x)=1$$

$$= f\cdot g - \int f\cdot g'\,dx =$$

$$-x\frac{\cos(3x)}{3} + \int\frac{\cos(3x)}{3}\,dx$$

$$\frac{1}{3}\int\cos(3x)\,dx$$

$$\int\sin(3x)\,dx = \int\sin u\,\frac{du}{3} = \frac{1}{3}\cos u = -\frac{1}{3}\cos(3x) =$$

$u=3x$

$du=3dx$

$dx=\frac{du}{3}$

$$= \frac{-x\cos(3x)}{3} + \frac{1}{9}\sin(3x) + C$$

3

$$\int (x+1)(x+2)^6\,dx =$$

$f(x) = x+1 \qquad g'(x) = (x+2)^6$

$f'(x) = 1 \qquad g(x) = \int (x+2)^6\,dx$

נפתור באינטגרציה בהצבה:

$u = x+2$

$du = 1 = dx$

$$\int u^6\,du = \frac{u^7}{7} + c = \frac{(x+2)^7}{7} + c$$

נציב בנוסחה:

$$\int (x+1)(x+2)^6\,dx =$$

$$\frac{(x+1)(x+2)^7}{7} - \int 1\cdot\frac{(x+2)^7}{7}\,dx$$

נפתור את האינטגרל בשיטת ההצבה

$$\int \frac{(x+2)^7}{7}\,dx = \frac{1}{7}\int (x+2)^7\,dx =$$

$u = x+2$

$du = 1 = dx$

$$\frac{1}{7}\int u^7\,du = \frac{1}{7}\cdot\frac{u^8}{8} + c = \frac{(x+2)^8}{56} + c$$

נציב את פתרון האינטגרל חזרה

$$\int (x+1)(x+2)^6\,dx = \frac{(x+1)(x+2)^7}{7} - \frac{(x+2)^8}{56} + c$$

4

$$\int (x-2)\cos(5x)\,dx =$$

$f(x) = x-2 \qquad g'(x) = \cos(5x)$

$f'(x) = 1 \qquad g(x) = \int \cos(5x)\,dx$

נפתור באינטגרציה בהצבה!

$u = 5x$

$du = 5\,dx$

$dx = \frac{du}{5}$

$$\int \cos u\,\frac{du}{5} = \frac{1}{5}\int \cos u\,du =$$

$$\frac{1}{5}\sin u + c = \frac{1}{5}\sin(5x) + c$$

נציב בנוסחא הנתונה!

$$\int (x-2)\cos(5x)\,dx = (x-2)\frac{1}{5}\sin(5x) - \int 1\cdot\frac{1}{5}\sin(5x)\,dx$$

נפתור בשיטת ההצבה!

$$\frac{1}{5}\int \sin(5x)\,dx =$$

$u = 5x$

$du = 5\,dx$

$dx = \frac{du}{5}$

$$\frac{1}{5}\int \sin u\,\frac{du}{5} = \frac{1}{25}\int \sin u\,du =$$

$$\frac{1}{25}\cdot -\cos u + c = -\frac{1}{25}\cos(5x) + c$$

נציב את פתרון האינטגרל חזרה!

$$\int (x-2)(\cos(5x))\,dx =$$

$$(x-2)\frac{1}{5}\sin(5x) - -\frac{1}{25}\cos(5x) =$$

$$(x-2)\frac{1}{5}\sin(5x) + \frac{1}{25}\cos(5x) + c$$

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קסם

(5) $\int x^2\cos x\,dx$

$F(x)=x^2 \qquad g'(x)=\cos x$

$f'(x)=2x \qquad g(x)=\int \cos x\,dx$

$g(x)=\sin x+c$

נציב בנוסחה את הנתונים:

$\int x^2\cos dx = x^2\sin x - \underline{\int 2x\sin x\,dx}$

נפתור את האינטגרל בעזרת אינטגרציה בחלקים:

$f(x)=2x \qquad g'(x)=\sin x$

$f'(x)=2 \qquad g(x)=\int \sin x\,dx = \cos x+c$

נציב את הנתונים בנוסחה:

$\int 2x\sin x\,dx = -2x\cos x - \underline{\int (2)(-\cos x)}\,dx$

נפתור את האינטגרל:

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

נציב חזרה:

$\int 2x\sin x\,dx = -2x\cos x - -2\sin x =$

$-2x\cos x+2\sin x$

נציב חזרה:

$\int x^2\cos x = x^2\sin x + 2x\cos x + 2\sin x + c$

(6) $\int x^2\sin(3x)\,dx =$

$F(x)=x^2 \qquad g'(x)=\sin(3x)$

$f'(x)=2x \qquad g(x)=\int \sin(3x)\,dx$

נפתור בשיטת הצבה:

$u=3x$
$du=3\,dx$
$dx=\frac{du}{3}$

$\int \sin u\,\frac{du}{3} = \frac{1}{3}\int \sin u\,du =$

$\frac{1}{3}\cdot -\cos u + c = -\frac{1}{3}\cos(3x)+c$

נציב בנוסחה את הנתונים:

$\int x^2\sin(3x)\,dx = x^2\cdot -\frac{1}{3}\cos(3x) - \underline{\int 2x\cdot -\frac{1}{3}\cos(3x)\,dx}$

נפתור את האינטגרל בעזרת אינטגרציה בחלקים:

$\int 2x\cdot -\frac{1}{3}\cos(3x)\,dx = -\frac{2}{3}\int x\cos(3x)\,dx$

$F(x)=x \qquad g'(x)=\cos(3x)$

$f'(x)=1 \qquad g(x)=\int \cos(3x)\,dx = \frac{1}{3}\sin(3x)+c$

נציב בנוסחה:

$\int x\cos(3x)\,dx =$

$x\cdot\frac{1}{3}\sin(3x) -$

$\int 1\cdot\frac{1}{3}\sin(3x)\,dx$

נפתור את האינטגרל:

$\int 1\cdot\frac{1}{3}\sin(3x)\,dx =$

$\frac{1}{3}\int \sin(3x)\,dx$

כמו אינטגרל רגיל פשוט, ורק

$= -\frac{1}{9}\cos(3x)$

נציב בהגדרה:

$\int x\cos(3x)\,dx =$

$x\,\frac{1}{3}\sin(3x) - -\frac{1}{9}\cos(3x) =$

$\frac{1}{3}x\sin(3x) + \frac{1}{9}\cos(3x)$

בס"ד

$$\int x^2\sqrt{1+x}\,dx \qquad (7)$$

$f(x)=x^2 \qquad g'(x)=\sqrt{1+x}$

$f'(x)=2x \qquad g(x)=\int(1+x)^{\frac{1}{2}}dx=$

$\frac{2}{3}(1+x)^{\frac{3}{2}}+C$

נציב את הנתונים בנוסחה:

$$\int x^2\sqrt{1+x}\,dx=x^2\cdot\frac{2}{3}(1+x)^{\frac{3}{2}}-\underbrace{\int 2x\cdot\frac{2}{3}(1+x)^{\frac{3}{2}}dx}$$

נפתור את האינטגרל בחלקים

$$\int 2x\cdot\frac{2}{3}(1+x)^{\frac{3}{2}}dx=\int\frac{4}{3}x(1+x)^{\frac{3}{2}}dx=$$

$$\frac{4}{3}\int \underbrace{x}\,\underbrace{(1+x)^{\frac{3}{2}}}dx$$

$f(x)=x \qquad g'(x)=(1+x)^{\frac{3}{2}}$

$f'(x)=1 \qquad \underline{g(x)=\int(1+x)^{\frac{3}{2}}}\,dx$

$u=1+x$

$du=1\cdot dx$

$\int u^{\frac{3}{2}}du=\frac{2}{5}u^{\frac{5}{2}}+C$

נציב בנוסחה:

$$\frac{4}{3}\int x\sqrt{1+x}\,dx=x\sqrt{(1+x)^3}-\int\frac{2}{5}\sqrt{(1+x)^5}\,dx=$$

$$x\sqrt{(1+x)^3}-\frac{2}{5}\int\sqrt{(1+x)^5}\,dx=\frac{2}{7}\sqrt{(1+x)^7}$$

$$x\sqrt{(1+x)^3}-\frac{2}{5}\cdot\frac{2}{7}\sqrt{(1+x)^7}=x\sqrt{(1+x)^3}-\frac{4}{35}\sqrt{(1+x)^7}$$

נציב הכל:

$$\int x^2\sqrt{1+x}\,dx=x^2\cdot\frac{2}{3}\sqrt{(1+x)^3}-\frac{4}{3}\left(x\sqrt{(1+x)^3}-\frac{4}{35}\sqrt{(1+x)^7}\right)+C$$

$$\int\frac{1}{\sqrt{x}}\sin\sqrt{x}\,dx= \qquad =\int\frac{1}{\cancel{\sqrt{x}}}\cdot\sin u\cdot 2\cancel{\sqrt{x}}\,du= \qquad (8)$$

$u=\sqrt{x}$

$du=\frac{1}{2\sqrt{x}}dx \qquad 2\int\sin u\,du=2\cdot-\cos(u)+C=$

$dx=2\sqrt{x}\,du \qquad -2\cos(\sqrt{x})+C$

$$\int \frac{x}{\cos^2 x}\,dx =$$ (9)

$$\int x \cdot \cos^{-2} x\,dx =$$

$f(x) = x \qquad g'(x) = \frac{1}{\cos^2 x}$

$f'(x) = 1 \qquad g(x) = \int \frac{1}{\cos^2 x}\,dx = \tan x + c$

נציב בנוסחה:

$$\int \frac{x}{\cos^2 x}\,dx = x\tan x - \underbrace{\int 1 \cdot \tan x\,dx}$$

נפתור את האינטגרל בשיטת ההצבה

$$\int \tan dx = \int \frac{\sin x}{\cos x}\,dx = t$$

$u = \cos x$

$du = -\sin x\,dx$

$$\int \frac{\sin x}{u} \cdot -\frac{du}{\sin x} = -\int \frac{1}{u}\,du =$$

$$-\ln|u| = -\ln|\cos x| + c$$

נציב חזרה בנוסחה:

$$\int \frac{x}{\cos^2 x}\,dx = x\tan x - -\ln(|\cos x|) =$$

$$x\tan x + \ln(|\cos x|) + c$$

$$\int \frac{x}{\sqrt{1-x^2}}\,dx =$$ (10)

$f(x) = x \qquad g'(x) = \frac{1}{\sqrt{1-x^2}}$

$f'(x) = 1 \qquad g(x) = \int \frac{1}{\sqrt{1-x^2}}\,dx = \arcsin x + c$

נציב בנוסחה:

$$\int \frac{x}{\sqrt{1-x^2}}\,dx = x\arcsin x - \underbrace{\int 1 \cdot \arcsin x\,dx} - \int \arcsin x =$$

$$x\arcsin x + \sqrt{1-x^2} + c$$

נציב c:

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

$$-\sqrt{1-x^2} + c$$

$f(x) = \sqrt{\cos(x^2+1)}$ (1) (4)

$m(x) = \sqrt{x}$ $g(x) = \cos x$

$h(x) = x^2+1$

הפונ' היא הרכבה כך ש:

$f(x) = m(g(h(x)))$

$f'(x) = \frac{1}{2\sqrt{\cos(x^2+1)}} \cdot (\cos(x^2+1))' =$

$\frac{1}{2\sqrt{\cos(x^2+1)}} \cdot -\sin(x^2+1) \cdot (x^2+1)'$

$= \frac{1}{2\sqrt{\cos(x^2+1)}} \cdot -\sin(x^2+1) \cdot 2x$

$f(x) = \frac{1}{\sin(x^2+1)}$ (2)

$m(x) = \frac{1}{x}$ $g(x) = \sin x$

$h(x) = x^2+1$

$f(x) = m(g(h(x)))$

$f'(x) = ((\sin(x^2+1))^{-1})' = -(\sin(x^2+1))^{-2} \cdot (\sin(x^2+1))'$

$= -(\sin(x^2+1))^{-2} \cdot \cos(x^2+1) \cdot 2x$

$f(x) = \cos^2(3\sqrt{x})$ (3)

$m(x) = x^2$ $g(x) = \cos x$ $h(x) = 3x$ $l(x) = \sqrt{x}$

$f(x) = m(g(h(l(x))))$

$f'(x) = 2(\cos(3\sqrt{x})) \cdot (\cos(3\sqrt{x}))'$

$= 2(\cos(3\sqrt{x}) \cdot -\sin(3\sqrt{x}) \cdot \frac{3}{2\sqrt{x}}$

$f(x) = \tan^4(x^3)$ $m(x) = x^4$ $g(x) = \tan x$ (4)

$h(x) = x^3$

$f(x) = m(g(h(x)))$

$f'(x) = 4\tan^3(x^3) \cdot (\tan(x^3))'$

$= 4\tan^3(x^3) \cdot \frac{1}{\cos^2(x^3)} \cdot 3x^2$