4ª Lista Integral (2ª Avaliativa)
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(1) $\int \sqrt{3x+4}\, dx$

$\int \frac{1}{3} \cdot \sqrt{t}\, dt$

$\frac{1}{3} \cdot \int \sqrt{t}\, dt \Rightarrow \frac{1}{3} \int t^{\frac{1}{2}}\, dt$

$\frac{1}{3} \cdot \frac{2t\sqrt{t}}{3} \Rightarrow \frac{1}{3} \cdot \frac{2(3x+4)\sqrt{3x+4}}{3}$

$$\boxed{\frac{2\sqrt{3x+4} \cdot (3x+4)}{9} + C}$$

(2) $\int x(x^2+1)^{50}\, dx$

$\int \frac{t^{50}}{2} dt \Rightarrow \frac{1}{2} \cdot \int t^{50}\, dt$

$\frac{1}{2} \cdot \frac{t^{51}}{51} \Rightarrow \frac{1}{2} \cdot \frac{(x^2+1)^{51}}{51}$

$$\boxed{\frac{(x^2+1)^{51}}{102} + C}$$

(3) $$\int \frac{x}{3(x^2-8)^5}\,dx$$

$$\frac{1}{3}\cdot\int \frac{x}{(x^2-8)^5}\,dx$$

$$\frac{1}{3}\cdot\int \frac{1}{2t^5}\,dt \rightarrow \frac{1}{3}\cdot\frac{1}{2}\cdot\int \frac{1}{t^5}\,dt$$

$$\frac{1}{6}\cdot\left(-\frac{1}{4t^4}\right) \rightarrow \frac{1}{6}\cdot\left(-\frac{1}{4(x^2-8)^4}\right)$$

$$\boxed{-\frac{1}{24(x^2-8)^4}+C}$$

(4) $$\int \frac{4x^2}{(1-8x^3)^4}\,dx$$

$$\int -\frac{1}{6t^4}\,dt$$

$$-\frac{1}{6}\cdot\int \frac{1}{t^4}\,dt \rightarrow -\frac{1}{6}\cdot\left(-\frac{1}{3t^3}\right)$$

$$-\frac{1}{6}\cdot\left(-\frac{1}{3(1-8x^3)^3}\right)$$

$$\boxed{\frac{1}{18(1-8x^3)^3}+C}$$

⑤- $\int x^2 \left(\frac{x^3}{18} - 1\right)^5 dx$

$\int u^5 x^2 \, dx \rightarrow \int u^5 \cdot 6 \, du$ $\quad u = \frac{x^3}{18} - 1$

$6 \int u^5 \, du$

$du = \frac{x^2}{6} dx$

$6 \, du = x^2 \, dx$

$6 \frac{u^6}{6} + C = u^6 + C$

$\boxed{\left(\frac{x^3}{18} + 1\right)^6 + C}$

⑥- $\int 2x^4 \left(\frac{x^5}{24} - 1\right)^6 dx$

$2 \cdot \int x^4 \cdot \left(\frac{x^5}{24} - 1\right)^6 dx$

$2 \cdot \int \frac{24 t^6}{5} dt \rightarrow 2 \cdot \frac{24}{5} \cdot \int t^6 \, dt$

$\frac{48}{5} \cdot \frac{t^7}{7} + C$

$\boxed{\frac{48}{35} \left(\frac{x^5}{24} - 1\right)^7 + C}$

7. $\int \frac{dx}{\sqrt{x}(1+\sqrt{x})^5}$

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

$u = 1+\sqrt{x}$

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

$du = \frac{1}{2}x^{-\frac{1}{2}}\,dx$

$2\,du = x^{-\frac{1}{2}}\,dx$

$\int u^{-5}x^{-\frac{1}{2}}\,dx \rightarrow \int u^{-5}\,2\,du$

$2\int u^{-5}\,du \rightarrow \frac{2u^{-4}}{-4}+C \rightarrow \boxed{-\frac{1}{2(1+\sqrt{x})^4}+C}$

8. $\int \frac{x^3}{(1-2x^4)^5}\,dx$

$\int x^3(1-2x^4)^{-5}$

$\int u^{-5}x^3\,dx$

$u = 1-2x^4$

$\int u^{-5} - \frac{du}{8} \rightarrow du = -8x^3\,dx$

$\frac{du}{-8} = x^3\,dx$

$-\frac{1}{8}\int u^{-5}\,du \rightarrow -\frac{1}{8}\frac{u^{-4}}{-4}+C$

$\boxed{-\frac{1}{32(1-2x^4)^4}+C}$

9- $\int 5x\sqrt[3]{(9-4x^2)^2}\,dx$

$5\cdot\int x\sqrt[3]{(9-4x^2)^2}\,dx$

$5\cdot\int -\frac{1}{8}\sqrt[3]{t^2}\,dt \rightarrow 5\cdot\left(-\frac{1}{8}\right)\cdot\int\sqrt[3]{t^2}\,dt$

$-\frac{5}{8}\int t^{\frac{2}{3}}\,dt \rightarrow -\frac{5}{8}\cdot\frac{3t\sqrt[3]{t^2}}{5}$

$-\frac{5}{8}\cdot\frac{3(9-4x^2)\sqrt[3]{(9-4x^2)^2}}{5}$

$$\boxed{-\frac{3}{8}\cdot\sqrt[3]{(9-4x^2)^2}\cdot(9-4x^2)+C}$$

10- $\int\frac{5x\sqrt[3]{x}+1x^2}{\sqrt[3]{x}}\,dx \rightarrow$

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

$5\int x^{\frac{4}{3}+1}\,dx+\int x^{\frac{5}{3}+1}\,dx$

$\frac{5x^{\frac{7}{3}}}{\frac{7}{3}}+\frac{x^{\frac{8}{3}}}{\frac{8}{3}}+C$

$$\boxed{\frac{15}{7}\sqrt[3]{x^7}+\frac{3}{8}\sqrt[3]{x^8}+C}$$

(11)- $\int -x^2\left(\frac{x^3}{2}-4\right)^5 dx$

$-\int x^2 \cdot \left(\frac{x^3}{2}-4\right)^5 dx \to -\int \frac{2t^5}{3} dt$

$-\frac{2}{3} \cdot \int t^5 dt \to -\frac{2}{3} \cdot \frac{t^6}{6}$

$-\frac{2}{3} \cdot \frac{\left(\frac{x^3}{2}-4\right)^6}{6} \to \boxed{-\frac{(x^3-8)^6}{576}+C}$

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

$\int \frac{1}{9} \cdot \sqrt{t}\, dt \to \frac{1}{9} \cdot \int \sqrt{t}\, dt$

$\frac{1}{9} \cdot \int t^{\frac{1}{2}} dt \to \frac{1}{9} \cdot \frac{2t\sqrt{t}}{3}$

$\frac{1}{9} \cdot \frac{2(3x^3-5)\sqrt{3x^3-5}}{3}$

$\boxed{\frac{2\sqrt{3x^3-5} \cdot (3x^3-5)}{27}+C}$

13.) $\int \frac{2x}{\sqrt{3x^2+1}}\,dx$

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

$2\int u^{-\frac{1}{2}} + \frac{du}{6} \rightarrow du = 6x\,dx$

$\frac{du}{6} = x\,dx \rightarrow -1-\frac{1}{2} = \frac{2-1}{2} = \frac{1}{2}$

$\frac{1}{3}\,\frac{u^{\frac{1}{2}}}{\frac{1}{2}} + C$

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

14.) $\int \frac{3x^2}{(1-8x^3)^4}\,dx$

$3\int x^2 \cdot (1-8x^3)^{-4}\,dx$

$u = 1-8x^3$

$du = -24x^2\,dx$

$-\frac{du}{24} = x^2\,dx$

$3\int u^{-4} x^2\,dx \rightarrow 3\int u^{-4} - \frac{du}{24}$

$-\frac{3}{24}\int u^{-4+1}\,du \rightarrow -\frac{1}{8}\,\frac{u^{-3}}{-3} + C$

$\boxed{\frac{1}{24(1-8x^3)^3} + C}$

15. $\int \sqrt{x}\,(7x^2 - 5x + 3)\,dx$

$$\int x^{\frac{1}{2}} \cdot 7x^2 - 5\int x^{\frac{1}{2}} \cdot x^1 + 3\int x^{\frac{1}{2}}\,dx$$

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

$$\frac{7x^{\frac{7}{2}}}{\frac{7}{2}} - \frac{5x^{\frac{5}{2}}}{\frac{5}{2}} + \frac{3x^{\frac{3}{2}}}{\frac{3}{2}} + c$$

$$\frac{14}{7}\sqrt{x^7} - \frac{10}{5}\sqrt{x^5} + \frac{6}{3}\sqrt{x^3} + c$$

$$\boxed{2\sqrt{x^7} - 2\sqrt{x^5} + 2\sqrt{x^3} + c}$$