$$\int \frac{1}{\sqrt{25-x^2}}\,dx = \int \frac{1}{\sqrt{5^2-x^2}}\,dx = \sin^{-1}\left(\frac{x}{5}\right)+C$$

$$\int \frac{-9}{81+x^2}\,dx = -9\cdot\int \frac{1}{9^2+x^2}\,dx = -9\cdot\frac{1}{9}\tan^{-1}\left(\frac{x}{9}\right)+C = -\tan^{-1}\left(\frac{x}{9}\right)+C$$

$$\int \frac{8}{\sqrt{1-9x^2}}\,dx = 8\cdot\int \frac{1}{\sqrt{1-(3x)^2}}\,dx = 8\cdot\frac{1}{3}\int \frac{1}{\sqrt{1-u^2}}\,du = \frac{8}{3}\sin^{-1}u+C = \frac{8}{3}\sin^{-1}(3x)+C$$

$$\int \frac{1}{16x^2+1}\,dx = \int \frac{1}{1+(4x)^2}\,dx = \frac{1}{4}\cdot\int \frac{1}{1+u^2}\,du = \frac{1}{4}\cdot\tan^{-1}u+C = \frac{1}{4}\tan^{-1}(4x)+C$$

$$\int \frac{4x}{\sqrt{1-x^2}}\,dx = -2\cdot\int \frac{1}{\sqrt{u}}\,du = -2\cdot 2\sqrt{u}+C = -4\sqrt{1-x^2}+C$$

$$\int \frac{x+1}{x^2+5}\,dx = \int \frac{x}{x^2+5}\,dx + \int \frac{1}{x^2+5}\,dx = \frac{1}{2}\cdot\int \frac{1}{u}\,du + \int \frac{1}{\sqrt{5}^2+x^2}\,dx = \frac{1}{2}\ln|u| + \frac{1}{\sqrt{5}}\tan^{-1}\left(\frac{x}{\sqrt{5}}\right)+C$$

$$= \frac{1}{2}\ln\left(x^2+5\right) + \frac{1}{\sqrt{5}}\tan^{-1}\left(\frac{x}{\sqrt{5}}\right)+C$$

$$\int \frac{3-x}{\sqrt{9-x^2}}\,dx = \int \frac{3}{\sqrt{9-x^2}}\,dx + \int \frac{-x}{\sqrt{9-x^2}}\,dx = 3\cdot\int \frac{1}{\sqrt{3^2-x^2}}\,dx + \frac{1}{2}\cdot\int \frac{1}{\sqrt{u}}\,du = 3\cdot\sin^{-1}\left(\frac{x}{3}\right) + \frac{1}{2}\cdot 2\sqrt{u}+C$$

$$= 3\sin^{-1}\left(\frac{x}{3}\right) + \sqrt{9-x^2}+C$$

$$\int \frac{2x}{1+x^4}\,dx = \int \frac{2x}{1+\left(x^2\right)^2}\,dx = \int \frac{1}{1+u^2}\,du = \tan^{-1}u+C = \tan^{-1}\left(x^2\right)+C$$

$$\int \frac{e^x}{\sqrt{1-e^{2x}}}\,dx = \int \frac{e^x}{\sqrt{1-\left(e^x\right)^2}}\,dx = \int \frac{1}{\sqrt{1-u^2}}\,du = \sin^{-1}u+C = \sin^{-1}\left(e^x\right)+C$$

$$\int \frac{\sqrt{x}}{4+x}\,dx$$ This one is a bonus in class, so no solution ☺