(12) $\int (3x+15)\sqrt{x^2+10x+4}\,dx$

$3(x+5)$

$u = x^2+10x+4$

$du = (2x+10)dx$

$du = 2(x+5)dx$

$\frac{1}{2}du = (x+5)dx$

$\int 3u^{1/2}\cdot\frac{1}{2}du$

$\frac{3}{2}\int u^{1/2}du$

$\frac{3}{2}\cdot\frac{u^{3/2}}{3/2}+C$

$u^{3/2}+C$

$(x^2+10x+4)^{3/2}+C$

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

$u = x-2$ $\quad du = dx$

$+4 \quad +4$

$u+4 = x+2$

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

$\int (u^{3/2}+4u^{1/2})du$

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

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

$\int \frac{x^2}{\sqrt{x-4}}dx$ $\quad u = x-4$ $\quad du = dx$

$u+4 = x$

$(u+4)^2 = x^2$

$u^2+8u+16 = x^2$

$\int \frac{u^2+8u+16}{u^{1/2}}du$