A = u-substitution
B = parts
C = trig. integration
D = trig. subst.
E = partial fractions

1. $\int (e^x + x)^2 \, dx$ [Hint: FOIL first] $B: \frac{1}{2}e^{2x} + 2xe^x - 2e^x + \frac{1}{3}x^3 + c$

2. $\int \frac{1}{\sqrt{x^2 - 4}} \, dx$ $D: \ln\left| \frac{x}{2} + \frac{\sqrt{x^2 - 4}}{2} \right| + c$

3. $\int x\sqrt{1+x} \, dx$ $A: \frac{2}{5}(1+x)^{5/2} - \frac{2}{3}(1+x)^{3/2} + c$ or $B: \frac{2}{3}x(1+x)^{3/2} - \frac{4}{15}(1+x)^{5/2} + c$

4. $\int \tan^2 x \sec^2 x \, dx$ $C: \frac{1}{3}\tan^3 x + c$

5. $\int \frac{1}{x\sqrt{9+x^2}} \, dx$ [Hint: $\int \csc\theta \, d\theta = -\ln|\csc\theta + \cot\theta| + c$] $D: -\frac{1}{3}\ln\left| \frac{\sqrt{9+x^2}}{x} + \frac{3}{x} \right| + c$

6. $\int \frac{\sin x}{2 + \cos x} \, dx$ $A: -\ln|2 + \cos x| + c$

7. $\int \sec^6 x \, dx$ $C: \tan x + \frac{2}{3}\tan^3 x + \frac{1}{5}\tan^5 x + c$

8. $\int x \sec^2 x \, dx$ $B: x\tan x - \ln|\sec x| + c$

9. $\int \frac{6}{(x-1)(x^2+1)} \, dx$ $E: 3\ln|x-1| - \frac{3}{2}\ln|x^2+1| - 3\tan^{-1}x + c$

10. $\int x^3 \sqrt{1-x^2} \, dx$ $D: \frac{1}{5}(1-x^2)^{5/2} - \frac{1}{3}(1-x^2)^{3/2} + c$

11. $\int \frac{8}{x^4 + 2x^3} \, dx$ $E: \ln|x| + \frac{2}{x} - \frac{2}{x^2} - \ln|x+2| + c$