1. For each problem, I have listed two different functions that have the given derivative.

   (a)
   - $y = 3x + 2$
   - $y = 3x - 3$

   (b)
   - $y = x^3 + 5$
   - $y = x^3 - 7$

   (c)
   - $w = 2x^4 - \frac{1}{3}x^3 + \frac{5}{2}x^2 - 10x + 11$
   - $w = 2x^4 - \frac{1}{3}x^3 + \frac{5}{2}x^2 - 10x - 13$

   (d)
   - $h = 4\ln(t) + 17$
   - $h = 4\ln(t) - 19$

   (e)
   - $y = 30e^x + 5x + 23$
   - $y = 30e^x + 5x - 29$

   (f)
   - $q = -50e^{-t} + 31$
   - $q = -50e^{-t} - 37$

   (g)
   - $P = \frac{1}{4}t^4 - \frac{1}{2}t^{-2} + 41$
   - $P = \frac{1}{4}t^4 - \frac{1}{2}t^{-2} - 43$

   (h)
   - $y = \ln(x + 4) + 47$
   - $y = \ln(x + 4) - 53$

   (i)
   - $z = \frac{1}{3}e^{3y} + 59$
   - $z = \frac{1}{3}e^{3y} - 61$

(j)
- $v = -100e^{-r} + 67$
- $v = -100e^{-r} - 71$

(k)
- $s = 4e^{t} - 3^{-t} + 73$
- $s = 4e^{t} - 3^{-t} - 79$

(l)
- $P = 2\sqrt{t} + 83$
- $P = 2\sqrt{t} - 89$

(m)
- $P = 2\ln(t) + 3t^{-1} + 97$
- $P = 2\ln(t) + 3t^{-1} - 101$

(n)
- $h = 15e^{2s} + \frac{1}{3}e^{3s} + 103$
- $h = 15e^{2s} + \frac{1}{3}e^{3s} - 107$

(o)
- $P = 100e^{0.05t} + 109$
- $P = 100e^{0.05t} - 113$

(p)
- $y = \frac{1}{2}e^{x^2} + 127$
- $y = \frac{1}{2}e^{x^2} - 131$

(q)
- $y = \left(x^2 + 1\right)^4 + 137$
- $y = \left(x^2 + 1\right)^4 - 139$

(r)
- $y = \frac{8}{3}\left(x^3 + 7\right)^{3/2} + 149$
- $y = \frac{8}{3}\left(x^3 + 7\right)^{3/2} - 151$

(s)
- $y = 6e^{-0.25x^2} + 157$
- $y = 6e^{-0.25x^2} - 163$

2. The indefinite integral represents the most general antiderivative of the integrand and so is an entire family of functions (hence the $+C$).

(a) $\displaystyle\int 3\,dx \;=\; 3x + C$

(b) $\displaystyle\int 3x^2\,dx \;=\; x^3 + C$

(c) $\displaystyle\int \left(8x^3 - x^2 + 5x - 10\right)\,dx \;=\; 2x^4 - \frac{1}{3}x^3 + \frac{5}{2}x^2 - 10x + C$

(d) $\displaystyle\int \frac{4}{t}\,dx \;=\; 4\ln(t) + C$

(e) $\displaystyle\int (30e^x + 5)\,dx \;=\; 30e^x + 5x + C$

(f) $\displaystyle\int 50e^{-t}\,dt \;=\; -50e^{-t} + C$

(g) $\displaystyle\int \left(t^3 + \frac{1}{t^3}\right)\,dt \;=\; \frac{1}{4}t^4 - \frac{1}{2}t^{-2} + C$

(h) $\displaystyle\int \frac{1}{x+4}\,dx \;=\; \ln(x+4) + C$

(i) $\displaystyle\int e^{3y}\,dy \;=\; \frac{1}{3}e^{3y} + C$

(j) $\displaystyle\int \frac{100}{e^r}\,dr \;=\; -100e^{-r} + C$

(k) $\displaystyle\int \left(4e^t + 3e^{-t}\right)\,dt \;=\; 4e^t - 3e^{-t} + C$

(l) $\displaystyle\int \frac{1}{\sqrt{t}}\,dt \;=\; 2\sqrt{t} + C$

(m) $\displaystyle\int \left(\frac{2}{t} - \frac{3}{t^2}\right)\,dt \;=\; 2\ln(t) + 3t^{-1} + C$

(n) $\displaystyle\int \left(30e^{2s} + e^{3s}\right)\,ds \;=\; 15e^{2s} + \frac{1}{3}e^{3s} + C$

(o) $\displaystyle\int 5e^{0.05t}\,dt \;=\; 100e^{0.05t} + C$

(p) $\displaystyle\int xe^{x^2}\,dx \;=\; \frac{1}{2}e^{x^2} + C$

(q) $\displaystyle\int 8x\left(x^2+1\right)^3\,dx \;=\; \left(x^2+1\right)^4 + C$

(r) $\displaystyle\int 12x^2\sqrt{x^3+7}\,dx \;=\; \frac{8}{3}\left(x^3+7\right)^{3/2} + C$

(s) $\displaystyle\int -3xe^{-0.25x^2}\,dx \;=\; 6e^{-0.25x^2} + C$