P, 213

4a) $y = x^3 - 9x^2 + 15x + 30$

$y' = 3x^2 - 18x + 15$

$y'' = 6x - 18$

b) $y = -4x^3 + 18x^2$

$y' = -12x^2 + 36x$

$y'' = -24x + 36$

c) $y = 3 + \frac{1}{(x+2)^2}$

☆ → just graph $y = \frac{1}{(x+2)^2}$

→ then, translate every point up 3 units

$y' = \frac{-2}{(x+2)^3}$ $\quad y'' = \frac{6}{(x+2)^4}$

d) $y = x^4 - 4x^3 - 8x^2 + 48x$

$y' = 4(x-2)(x-3)(x+2)$

$y'' = 12x^2 - 24x - 16$

e) $y = \frac{2x}{x^2 - 25}$

$y' = \frac{-2(x^2+25)}{(x-5)^2(x+5)^2}$

$y'' = \frac{4x(x^2+75)}{(x+5)^3(x-5)^3}$

P, 213

#9)

$y' = \frac{x+1}{x^{2/3}(x+3)^{1/3}}$

$y'' = \frac{-2}{x^{5/3}(x+3)^{4/3}}$

f) $y = \frac{1}{x^2-4x}$

$y' = \frac{-2(x-2)}{x^2(x-4)^2}$

$y'' = \frac{2(3x^2-12x+16)}{x^3(x-4)^4}$

g) $y = \frac{6x^2-2}{x^3}$ $\quad y' = \frac{-6(x-1)(x+1)}{x^4}$

$y'' = \frac{12x^2-24}{x^5}$

h) $y = \frac{x+3}{x^2-4}$ $\quad y' = \frac{-x^2-6x-4}{(x-2)^2(x+2)^2}$

$y'' = \frac{2(x^3+9x^2+12x+12}{(x-2)^3(x+2)^3}$

(*) note $x^3+9x^2+12x+12 < 0$
for $x < \approx -7.6$, but > 0
for $x > \approx -7.6$

i) $y = \frac{x^2-3x+6}{x-1}$ $\quad y' = \frac{(x-3)(x+1)}{(x-1)^2}$

$y'' = \frac{8}{(x-1)^3}$

j) $y = (x-4)^{2/3}$

$y' = \frac{2}{3(x-4)^{1/3}}$ $\quad y'' = \frac{-2}{9(x-4)^{4/3}}$