43 c)

$$\int \boxed{3 \sin(3x+2)\,dx} = \int \sin(u)\,du = -\cos(u) + C$$

$u = 3x+2$

$\frac{du}{dx} = 3$

$= -\cos(3x+2) + C$

d)

$$\int \underbrace{\sum_{i=0}^{\infty} \frac{2}{i!}(x-2)^i}_{\text{Taylor - treat as poly}} dx. = \sum_{i=0}^{\infty} \frac{2}{i!}(x-2)^{i+1} \frac{1}{(i+1)}$$

44) a)

$$\int \frac{3x^2}{(x^3+2)^2}\,dx \quad (3x^2\,dx = du) = \int \frac{1}{u^2}\,du = \frac{1}{-1}u^{-1} + C = -\frac{1}{x^3+2} + C$$

$\frac{1}{u^2} = u^{-2}$

$u = x^3+2$

$\frac{du}{dx} = 3x^2$

c)

$$\int \frac{2\cdot(3+\sqrt{x})^{1/4}}{2\cdot\sqrt{x}}\,dx = \int 2(u)^{1/4}\,du = 2\cdot\frac{4}{5}u^{5/4}+C$$

$$= \frac{8}{5}(3+\sqrt{x})^{5/4}+C$$

$u = 3+\sqrt{x}$, $\sqrt{x} = x^{\frac{1}{2}}$

$$\frac{du}{dx} = \frac{1}{2}x^{-1/2} = \frac{1}{2\sqrt{x}}$$

45)

$$\int x^2 \sin(x)\,dx = -x^2\cdot\cos(x) - \int 2x\cdot(-\cos(x))\,dx$$

$f(x) = x^2$, $g'(x) = \sin(x)$

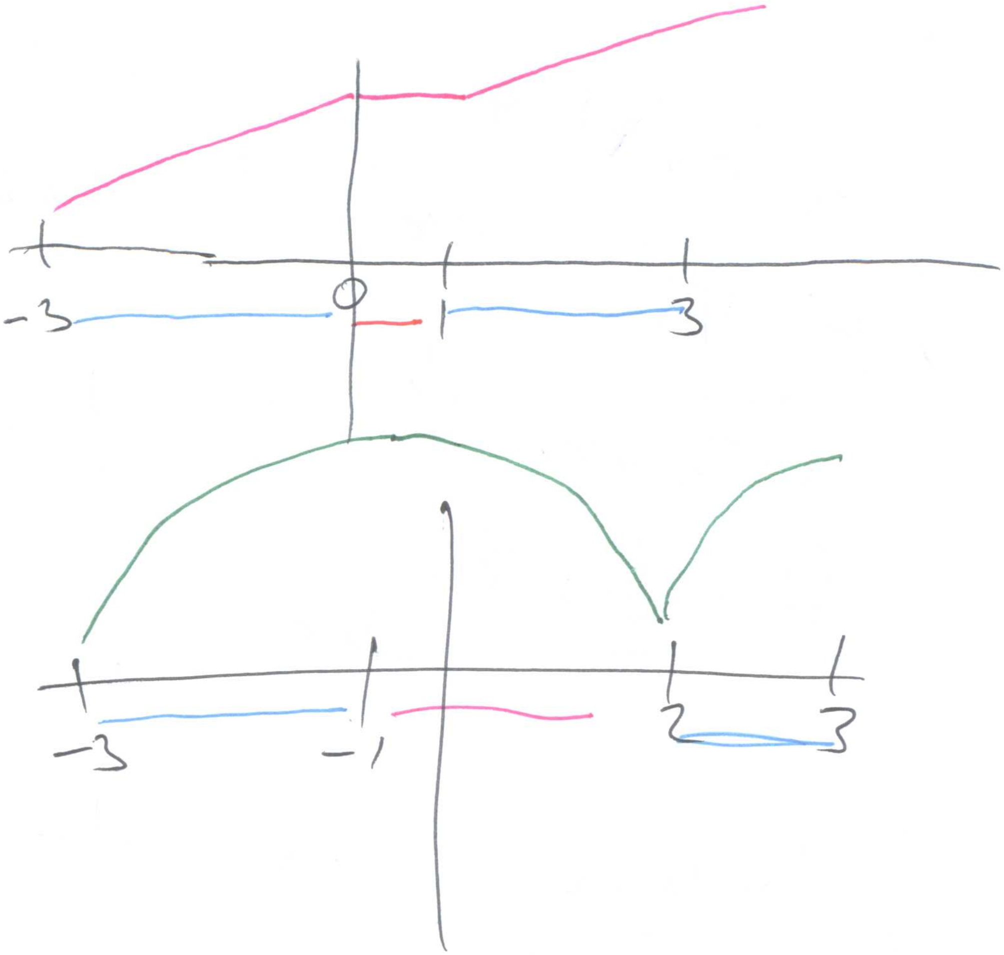
$f'(x) = 2x$, $g(x) = -\cos(x)$

$$= -x^2\cos(x) + 2\int \overset{f\cdot g'}{x\cdot\cos(x)}\,dx$$

$f(x) = x$, $g'(x) = \cos(x)$

$f'(x) = 1$, $g(x) = \sin(x)$

$$= -x^2\cos(x) + 2\left(\underset{f\cdot g}{x\cdot\sin(x)} - \underbrace{\int \overset{f'\cdot g}{1\cdot\sin(x)}\,dx}_{-\cos(x)+C}\right) = -x^2\cos(x) + 2(x\sin(x) + \cos(x)) + C$$



$f(x) = x^3 - 4x^2 + x + 2$

$f'(x) = 3x^2 - 8x + 1 = -\frac{1}{3} \cdot \left(-3x + \sqrt{13} + 4\right) \cdot \left(3x + \sqrt{13} - 4\right)$

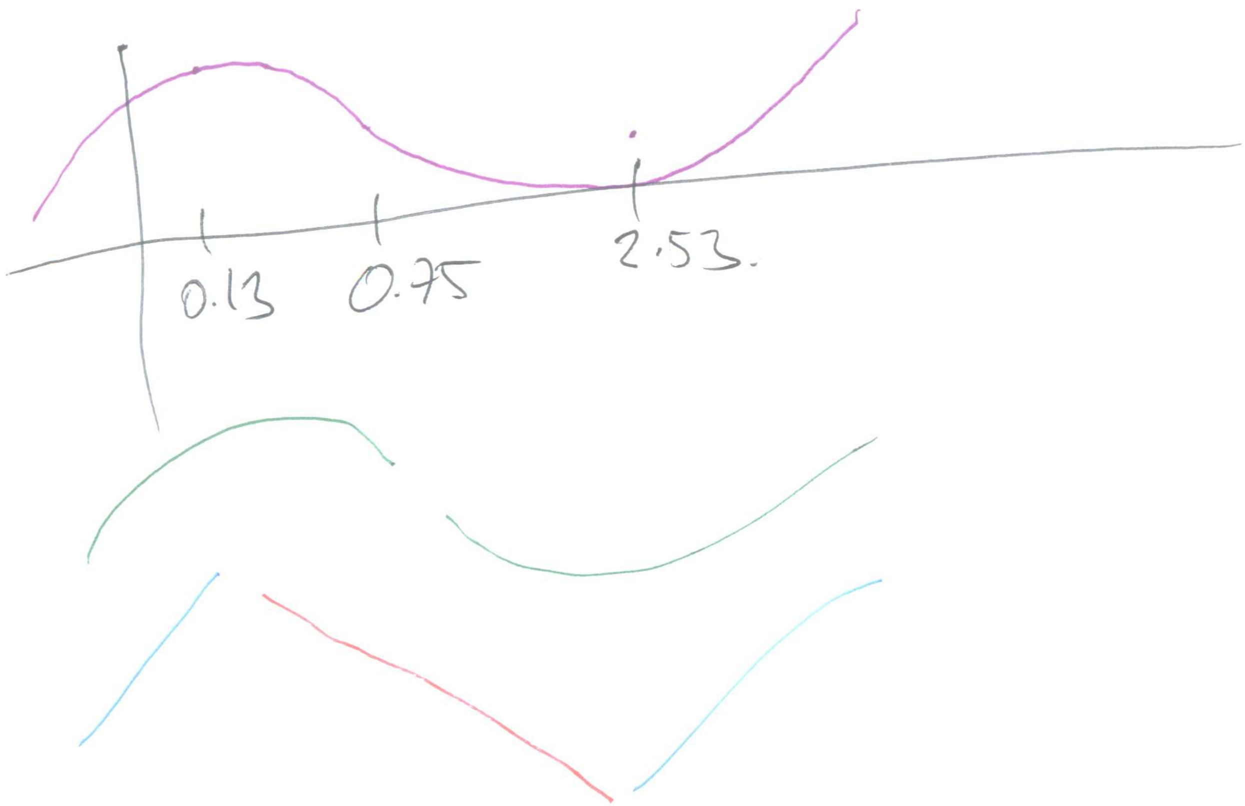
Zero at $\frac{1}{3}\left(4 - \sqrt{13}\right)$ ~ 0.13

$\frac{1}{3}\left(4 + \sqrt{13}\right)$ ~ 2.53

positive, neg. pos.

$f''(x) = 6x - 8 \Leftrightarrow$ zero at $x = \frac{8}{6} = \frac{4}{3}$ turning point

negative if x smaller, pos. if larger


0.13
0.75
2.53.