7 **(a)** $f(x) = \sqrt{3+(4x-2)^5}$ where $x > 1$.

Find an expression for $f'(x)$, giving your answer as a simplified algebraic fraction. [3]

(b) Variables x and y are related by the equation $y = \frac{5x}{3x+2}$. Using differentiation, find the approximate change in x when y increases from 10 by the small amount 0.01. [4]

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(c) **(i)** Differentiate $y = x^3 \ln x$ with respect to x. [2]

(ii) Hence find $\int\left(\frac{x^2}{6}(2+3\ln x)\right)\mathrm{d}x$. [3]

8 A curve has equation $y = \cos\frac{x}{4}$ where x is in radians. The normal to the curve at the point where $x = \frac{4\pi}{3}$ cuts the x-axis at the point P. Find the exact coordinates of P. [7]

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