10. The curve C has equation $y = f(x)$.

Given that

- $f'(x) = \dfrac{k\sqrt{x}(x-3)}{5}$ where k is a constant
- the point P with x coordinate 4 lies on C
- the equation of the normal to C at P is $y = -\dfrac{5}{4}x + 2$

(a) find an equation of the tangent to C at P, giving your answer in the form $y = mx + c$, where m and c are constants,

(3)

(b) find the value of k,

(2)

(c) find $f(x)$, writing the answer in simplest form.

(5)

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11. A curve has equation $y = f(x)$, where

$$f''(x) = \frac{6}{\sqrt{x^3}} + x \qquad x > 0$$

The point $P(4, -50)$ lies on the curve.

Given that $f'(x) = -4$ at P,

(a) find the equation of the normal at P, writing your answer in the form $y = mx + c$, where m and c are constants,

(3)

(b) find $f(x)$.

(8)

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1. Find

$$\int 12x^3 + \frac{1}{6\sqrt{x}} - \frac{3}{2x^4}\,dx$$

giving each term in simplest form.

(5)

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