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Integration

Higher Maths Exam Questions

Source: 2019 P2 Q2 Higher Maths	
(1)	Find $\int\left(6\sqrt{x}-4x^{-3}+5\right)dx.$
Answer: $4x^{\frac{3}{2}}+2x^{-2}+5x+c$	

Source: 2019 P2 Q13 Higher Maths	
(2)	For a function, f, defined on the set of real numbers, $\mathbb{R}$, it is known that • the rate of change of f with respect to x is given by $3x^2-16x+11$ • the graph with equation $y=f(x)$ crosses the x-axis at (7,0). Express $f(x)$ in terms of x.
Answer: $f(x)=x^3-8x^2+11x-28$	

Source: 2018 P1 Q10 Higher Maths	
(3)	Given that • $\frac{dy}{dx} = 6x^2 - 3x + 4$, and • $y = 14$ when $x = 2$, express y in terms of x.
Answer: $f(x) = 2x^3 - \frac{3}{2}x^2 + 4x - 4$	

Source: 2016 P2 Q9 Higher Maths	
(4)	For a function f, defined on a suitable domain, it is known that: • $f'(x) = \frac{2x+1}{\sqrt{x}}$ • $f(9) = 40$ Express $f(x)$ in terms of x.
Answer: $f(x) = \frac{4}{3}x^{\frac{3}{2}} + 2x^{\frac{1}{2}} - 2$	

Source: Specimen P1 Q1 Higher Maths	
(5)	Find $\int \frac{3x^3+1}{2x^2}\,dx,\ x \neq 0$.
Answer: $\frac{3}{4}x^2 - \frac{1}{2}x^{-1} + c$	

Source: 2015 P1 Q15 Higher Maths	
(6)	The rate of change of the temperature, T °C of a mug of coffee is given by $$\frac{dT}{dt} = \frac{1}{25}t - k\ ,\ 0 \le t \le 50$$ • t is the elapsed time, in minutes, after the coffee is poured into the mug • k is a constant • initially, the temperature of the coffee is 100 °C • 10 minutes later the temperature has fallen to 82 °C. Express T in terms of t.
Answer: $T = \frac{1}{50}t^2 - 2t + 100$	

Source: Exemplar P1 Q3 Higher Maths	
(7)	Evaluate $\int_1^2 \frac{1}{6}x^{-2}\ dx$.
Answer: $\frac{1}{2}$	

Source: 2014 P2 Q5 Higher Maths	
(8)	Given that $\int_4^t (3x+4)^{-\frac{1}{2}}\ dx = 2$, find the value of t.
Answer: $t = 15$	