

Calculus Non Calculator AB Grade

- [SQA] 1. A curve has equation $y = 2x^3 + 3x^2 + 4x - 5$.
Prove that this curve has no stationary points. 5
- [SQA] 2. Find the values of x for which the function $f(x) = 2x^3 - 3x^2 - 36x$ is increasing. 4
3. If $f(x) = (x - 3)(x + 5)$, for what values of x is the graph of $y = f(x)$ above the x -axis?
A. $-5 < x < 3$
B. $-3 < x < 5$
C. $x < -5, x > 3$
D. $x < -3, x > 5$ 2
4. The discriminant of a quadratic equation is 23.
Here are two statements about this quadratic equation:
I. the roots are real;
II. the roots are rational.
Which of the following is true?
A. neither statement is correct
B. only statement I is correct
C. only statement II is correct
D. both statements are correct 2
- [SQA] 5. Find $\int \frac{x^2 - 5}{x\sqrt{x}} dx$. 4
- [SQA] 6. Find the value of $\int_1^2 \frac{u^2 + 2}{2u^2} du$. 5

- [SQA] 7. Differentiate $\sin 2x + \frac{2}{\sqrt{x}}$ with respect to x . 4
- [SQA] 8. (a) Find the derivative of the function $f(x) = (8 - x^3)^{\frac{1}{2}}$, $x < 2$. 2
(b) Hence write down $\int \frac{x^2}{(8 - x^3)^{\frac{1}{2}}} dx$. 1
- [SQA] 9. Given that $f(x) = 5(7 - 2x)^3$, find the value of $f'(4)$. 4
- [SQA] 10. Differentiate $2x^{\frac{3}{2}} + \sin^2 x$ with respect to x . 4
- [SQA] 11. Find the derivative, with respect to x , of $\frac{1}{x^3} + \cos 3x$. 4
- [SQA] 12. Differentiate $\sin^3 x$ with respect to x .
Hence find $\int \sin^2 x \cos x dx$. 4
- [SQA] 13. Given $f(x) = \cos^2 x - \sin^2 x$, find $f'(x)$. 3
- [SQA] 14. Find $\frac{dy}{dx}$ given that $y = \sqrt{1 + \cos x}$. 3
- [SQA] 15. Given $f(x) = (\sin x + 1)^2$, find the exact value of $f'(\frac{\pi}{6})$. 3
- [SQA] 16. Find $\int \sqrt{1 + 3x} dx$ and hence find the exact value of $\int_0^1 \sqrt{1 + 3x} dx$. 4

[SQA] 17.

(a) Evaluate $\int_0^{\frac{\pi}{2}} \cos 2x \, dx$. 3

(b) Draw a sketch and explain your answer. 2

[SQA] 18. The curve $y = f(x)$ passes through the point $(\frac{\pi}{12}, 1)$ and $f'(x) = \cos 2x$.

Find $f(x)$. 3

[END OF QUESTIONS]