**4** What is $\int e + e^{3x}\,dx$ ?

A. $ex + 3e^{3x} + c$

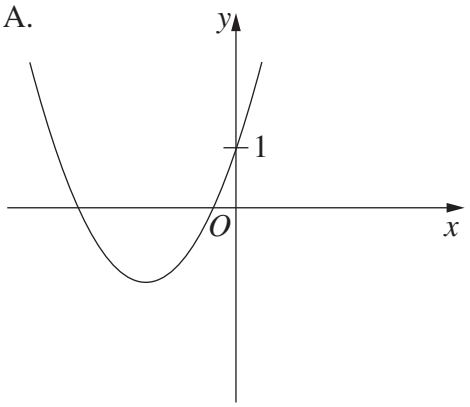
B. $ex + \frac{1}{3}e^{3x} + c$

C. $e + 3e^{3x} + c$

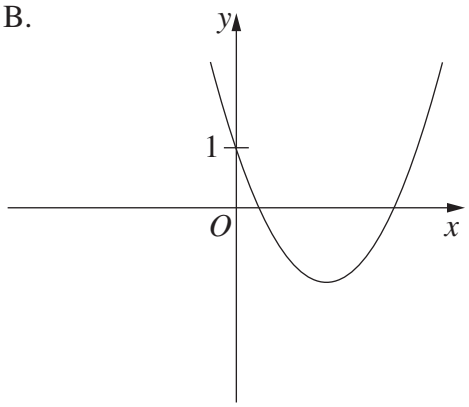
D. $e + \frac{1}{3}e^{3x} + c$

**5** Which of the following could represent the graph of $y = -x^2 + bx + 1$, where $b > 0$?

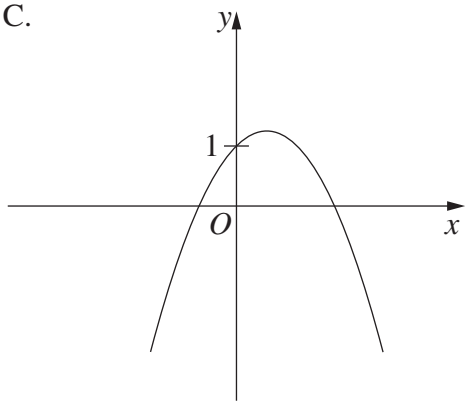
A.



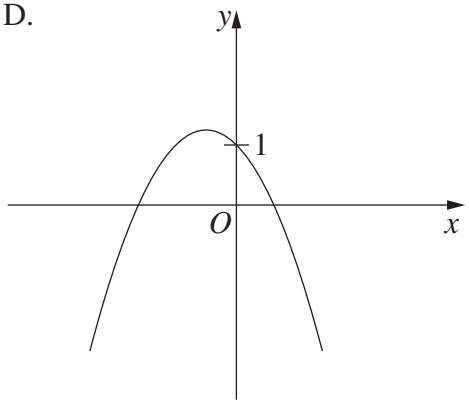

B.




C.




D.



**Question 12** (3 marks)

Calculate the sum of the arithmetic series $4 + 10 + 16 + \cdots + 1354$. **3**

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**Question 13** (2 marks)

Evaluate $\int_0^{\frac{\pi}{4}} \sec^2 x \, dx$. **2**

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**Question 17** (2 marks)

Find $\int \frac{x}{4+x^2}\,dx$. **2**

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**Question 18** (3 marks)

(a) Differentiate $e^{2x}(2x+1)$. **2**

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(b) Hence, find $\int (x+1)e^{2x}\,dx$. **1**

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**4** Which of the following is the range of the function $f(x) = x^2 - 1$?

A. $[-1, \infty)$

B. $(-\infty, 1]$

C. $[-1, 1]$

D. $(-\infty, \infty)$

**5** Let $h(x) = \dfrac{f(x)}{g(x)}$, where

$f(1) = 2 \qquad f'(1) = 4$

$g(1) = 8 \qquad g'(1) = 12.$

What is the gradient of the tangent to the graph of $y = h(x)$ at $x = 1$?

A. $-8$

B. $8$

C. $-\dfrac{1}{8}$

D. $\dfrac{1}{8}$

**6** What is $\displaystyle\int \frac{1}{(2x+1)^2}\,dx$?

A. $\dfrac{-2}{2x+1} + C$

B. $\dfrac{-1}{2(2x+1)} + C$

C. $2\ln(2x+1) + C$

D. $\dfrac{1}{2}\ln(2x+1) + C$

**Question 15** (2 marks)

Evaluate $\int_{-2}^{0} \sqrt{2x+4}\, dx$. **2**

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**Question 16** (3 marks)

For what values of $x$ is $f(x) = x^2 - 2x^3$ increasing? **3**

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**Question 17** (2 marks)

Find $\int x\sqrt{x^2+1}\,dx$ . **2**

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**Please turn over**