SYDNEY BOYS HIGH SCHOOL

NESA Number:

Name:

Maths Class: Circle below

A B 1 2 P L U S

2023

YEAR 12

TERM 2

HSC Task #3

Mathematics Extension 1

General Instructions

- Working Time – 65 minutes
- Write using black pen
- NESA approved calculators may be used
- Marks may **NOT** be awarded for messy or badly arranged work
- Unless otherwise stated, all answers should be left in simplified, exact form
- In Questions 11–18, show ALL relevant mathematical reasoning and/or calculations

Total Marks: **Section I – 10 marks (Personal Reference sheet)**

Leave your Personal Reference Sheet this booklet.

Section II – 10 marks (pages 2–5)
- Attempt Questions 1–10
- Allow about 15 minutes for this section

Section III – 30 marks (pages 6–8)
- Attempt Questions 11–18
- Allow about 45 minutes for this section

Examiner:

PSP

Marks	
Section I	**/10**
Section II	**/10**
Section III	**/30**
Total	**/50**

Section II

10 marks
Attempt Questions 1–10
Allow about 15 minutes for this section

Use the multiple-choice answer sheet for Questions 1–10.

---

1 Let $f(x) = \text{cosec}\, x$.

The graph of f is transformed by

- a vertical dilation by a factor of 3, followed by
- a translation of 1 unit horizontally to the right, followed by
- a horizontal dilation by a factor of $\frac{1}{2}$.

Which of the following functions is the transformed graph?

A. $g(x) = 3\text{cosec}(2x - 1)$

B. $g(x) = 3\text{cosec}\left(\frac{x}{2} - 1\right)$

C. $g(x) = 3\text{cosec}(2(x - 1))$

D. $g(x) = 3\text{cosec}\left(\frac{x - 1}{2}\right)$

2 Which of the following is the inverse function of $f(x) = 2x^{\frac{1}{4}}$?

A. $f^{-1}(x) = \dfrac{x^{\frac{1}{4}}}{16}$

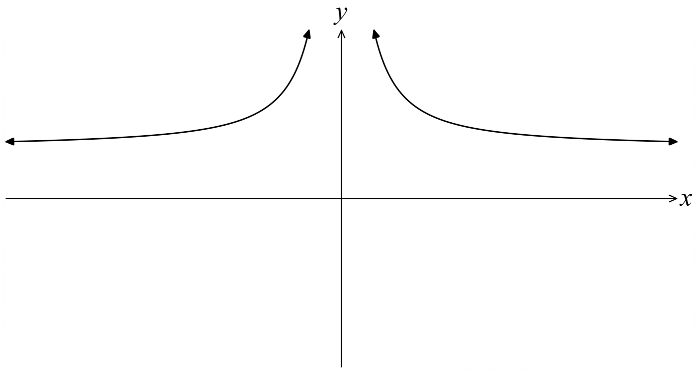
B. $f^{-1}(x) = \dfrac{x^4}{16}$

C. $f^{-1}(x) = \dfrac{x^4}{8}$

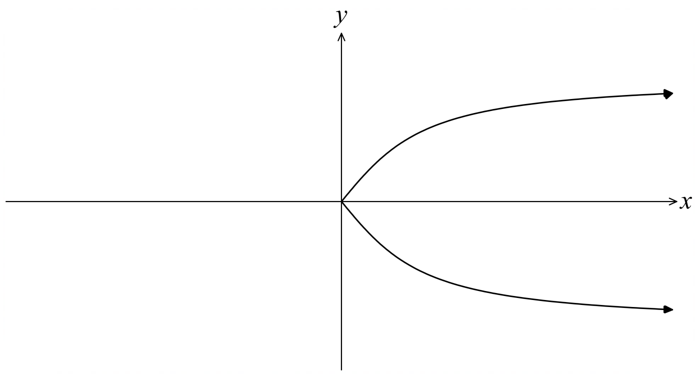
D. $f^{-1}(x) = \dfrac{x^4}{2}$

3 Which of the following sketches best represents $|y| = \arctan x$?

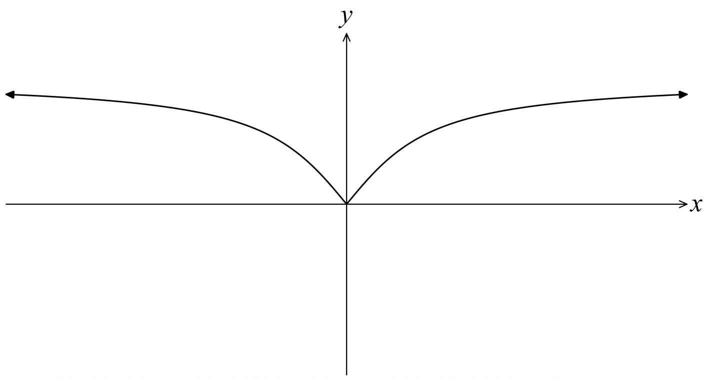
A.



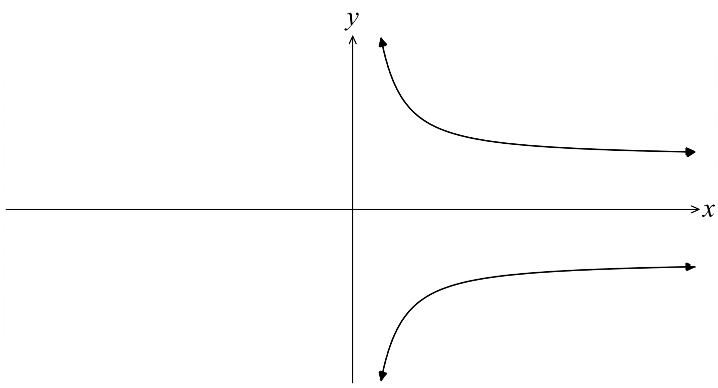
B.



C.



D.



4 Which of the following is equivalent to $\int_0^{\frac{\pi}{6}} \sin^5 x \cos x \, dx$, after applying the substitution $u = \sin x$?

A. $\int_0^{\frac{\pi}{6}} u^5 \, du$

B. $\int_0^{\frac{1}{2}} u^5 \, du$

C. $-\int_0^{\frac{\pi}{6}} u^5 \, du$

D. $-\int_0^{\frac{1}{2}} u^5 \, du$

5 Given that $f(x) = e^x - 1$ and $y = f^{-1}(x)$, which of the following is an expression for $\frac{dy}{dx}$?

A. $\frac{1}{e^x - 1}$

B. $\frac{1}{x + 1}$

C. $\ln x$

D. $\ln(x + 1)$

6 What is the value of $\arcsin(\cos\alpha)$, where $\pi < \alpha < \frac{3\pi}{2}$?

A. $\frac{\pi}{2} - \alpha$

B. $\frac{3\pi}{2} + \alpha$

C. $\alpha - \frac{3\pi}{2}$

D. $\frac{3\pi}{2} - \alpha$

7 If $y = \sin^{-1}\left(\frac{a}{x}\right)$ then which of the following is $\frac{dy}{dx}$, where a is a constant?

A. $-\frac{a}{x^2\sqrt{x^2 - a^2}}$

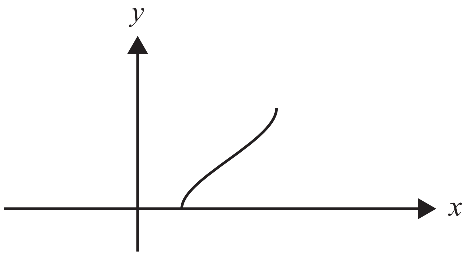
B. $-\frac{a}{x^2\sqrt{a^2 - x^2}}$

C. $-\frac{a}{|x|\sqrt{x^2 - a^2}}$

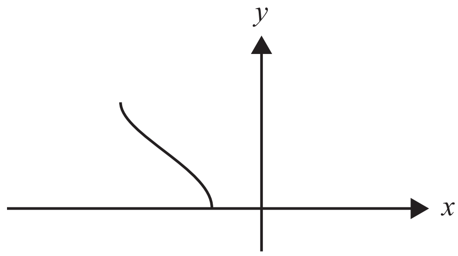
D. $-\frac{a}{|x|\sqrt{a^2 - x^2}}$

8 Which of the following could be the graph of $y = \arccos(2 - bx)$, where $b > 0$?

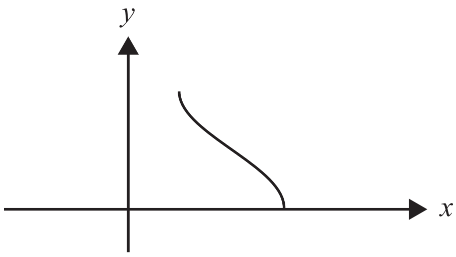
A.



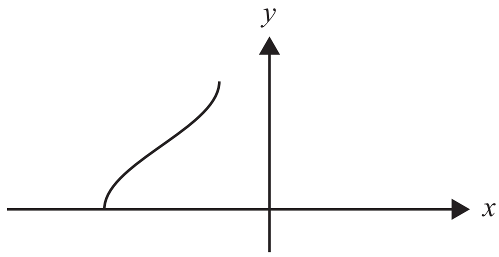
B.



C.



D.



9 What is the domain of f where $f(x) = \cos^{-1}(\ln(bx))$, where $b > 0$?

A. $\left[\frac{1}{b}, \frac{e}{b}\right]$

B. $\left[\frac{1}{b}, \frac{e^{\pi}}{b}\right]$

C. $\left[\frac{1}{be}, \frac{e}{b}\right]$

D. $\left[\frac{1}{be}, \frac{e^{\pi}}{b}\right]$

10 A given function $f(x)$ has an inverse $f^{-1}(x)$.

The derivatives of $f(x)$ and $f^{-1}(x)$ exist for all real numbers x.

The graphs $y = f(x)$ and $y = f^{-1}(x)$ have at least one point of intersection.

Which statement is true for all points of intersection of these graphs?

A. All points of intersection lie on the line $y = x$.

B. None of the points of intersection lie on the line $y = x$.

C. At no point of intersection are the tangents to the graphs parallel.

D. At no point of intersection are the tangents to the graphs perpendicular.

Section III – Part A

Label your Answer Booklet as Section III Part A

Part A – 15 marks

Attempt Questions 11 – 15

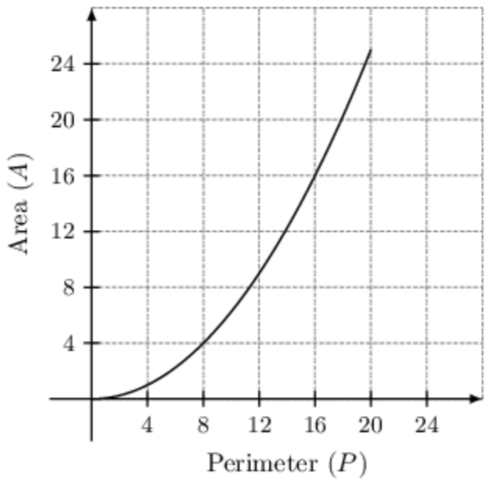
Your responses should include relevant mathematical reasoning and/or calculations.

11 The area, A, of a given square can be represented by the function

$$A(P) = \frac{P^2}{16}, P \geq 0,$$

where P is the perimeter of the square.

The graph of the function A, for $0 \leq P \leq 20$, is shown below.



(a) Find the value of $A(20)$. **1**

(b) Copy the diagram to your Answer booklet, and on it draw the graph of the inverse function, A^{-1}. **2**

(c) In the context of the question, explain the meaning of $A^{-1}(4) = 8$. **1**

12 Sketch the function $f(x) = 3\arcsin(2x)$. **2**
Clearly show any intersections with the coordinate axes and endpoints.

13 (a) Given that $x^2 + 4x + 5 \equiv (x + a)^2 + b^2$, find a and b. **1**

(b) Hence, using the substitution $u = x + a$, find $\displaystyle\int \frac{1}{x^2 + 4x + 5}\, dx$. **2**

14 Let $f(x) = \pi + \arccos(2x - 1) - 2\arccos\left(\sqrt{x}\right)$ for $x \in [0, 1]$.

(a) Show that $f'(x) = 0$. **2**

(b) Hence, find a simplified form of $f(x)$. **1**

15 The function f is defined as $f(x) = \sec x$ for $0 \leq x < \frac{\pi}{2}$.

(a) State the domain of the inverse function $f^{-1}(x)$. **1**

(b) Show that $f^{-1}(x) = \cos^{-1}\left(\frac{1}{x}\right)$. **2**

End of Part A

Section III – Part B

Label your Answer Booklet as Section III Part B

Part B **15 marks**

Attempt Questions 16 – 18

Your responses should include relevant mathematical reasoning and/or calculations.

---

16 Use the substitution $x = \cot\theta$ to evaluate $\displaystyle\int \frac{1}{\left(x^2+1\right)^2}\,dx$. **4**

You may use without proof that $\dfrac{d}{dx}(\cot x) = -\operatorname{cosec}^2 x$.

17 Use the substitution $u = x\ln x$ to evaluate $\displaystyle\int_1^2 \frac{\ln x^2 + 2}{(x\ln x + 1)^2}\,dx$. **4**

18 Consider the function h: $h(x) = \left|\ln(2x)\right| + 1,\ 0 < x \le \lambda$, where $\lambda \in \mathbb{R}$.

(a) By means of a simple graph, show that the maximum value of λ for which the inverse function of h exists is $\lambda = \frac{1}{2}$. **1**

(b) Let $\lambda = \dfrac{1}{2}$.

(i) Find $h^{-1}(x)$ and state its domain. **3**

(ii) Sketch the graph of $y = \left(h \circ h^{-1}\right)(x)$. **2**

(iii) Find the solution set for $h(x) = h^{-1}(x)$. **1**

End of paper

SYDNEY BOYS HIGH SCHOOL

2023	YEAR 12 TERM 3 ASSESSMENT TASK 3

Mathematics Extension 1

Sample Solutions

MC Answers

1	A	**6**	C
2	B	**7**	C
3	B	**8**	A
4	B	**9**	C
5	B	**10**	D

Section II Multiple Choice Solutions

1 Let $f(x) = \operatorname{cosec} x$.

The graph of f is transformed by

- a vertical dilation by a factor of 3, followed by
- a translation of 1 unit horizontally to the right, followed by
- a horizontal dilation by a factor of $\frac{1}{2}$.

Which of the following functions is the transformed graph?

A. $g(x) = 3\operatorname{cosec}(2x - 1)$

B. $g(x) = 3\operatorname{cosec}\left(\frac{x}{2} - 1\right)$

C. $g(x) = 3\operatorname{cosec}(2(x-1))$

D. $g(x) = 3\operatorname{cosec}\left(\frac{x-1}{2}\right)$

$f(2x-1)$ Shift 1 unit to the right followed by a dilation horizontally by a factor of $\frac{1}{2}$
This is the same as $f\left(2\left(x-\frac{1}{2}\right)\right)$, which is dilating by a factor of $\frac{1}{2}$ and then shifting to the right by a $\frac{1}{2}$ unit.

$f(2(x-1))$ A dilation horizontally by a factor of $\frac{1}{2}$ followed by a shift 1 unit to the right
This is the same as $f(2x-2)$, which is translating 2 units to the right followed by a horizontal dilation by a factor of $\frac{1}{2}$.

34 students got this question right

2 Which of the following is the inverse function of $f(x) = 2x^{\frac{1}{4}}$?

A. $f^{-1}(x) = \dfrac{x^{\frac{1}{4}}}{16}$

B. $f^{-1}(x) = \dfrac{x^4}{16}$

C. $f^{-1}(x) = \dfrac{x^4}{8}$

D. $f^{-1}(x) = \dfrac{x^4}{2}$

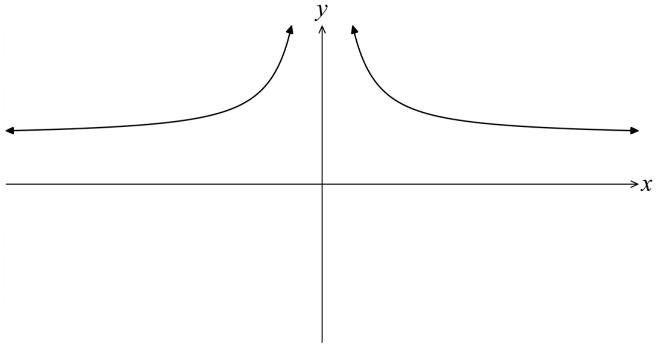
$y = 2x^{\frac{1}{4}} \Rightarrow \frac{y}{2} = x^{\frac{1}{4}}$

$\therefore x = \frac{1}{16}y^4$

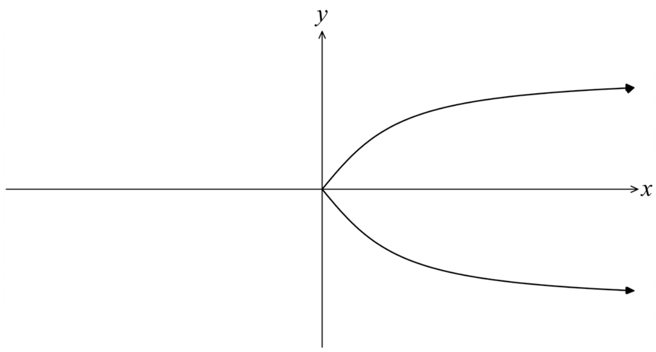
Now swap x and y.

3 Which of the following sketches best represents $|y| = \arctan x$?

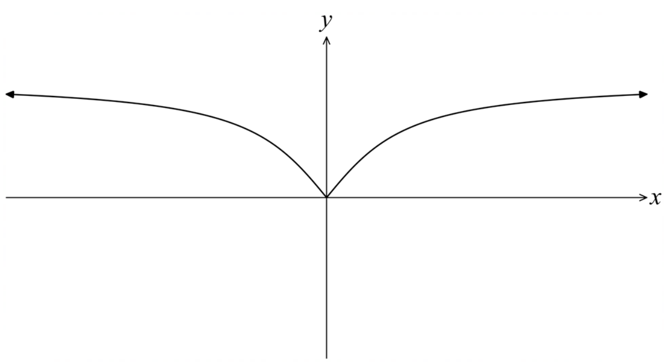
A.



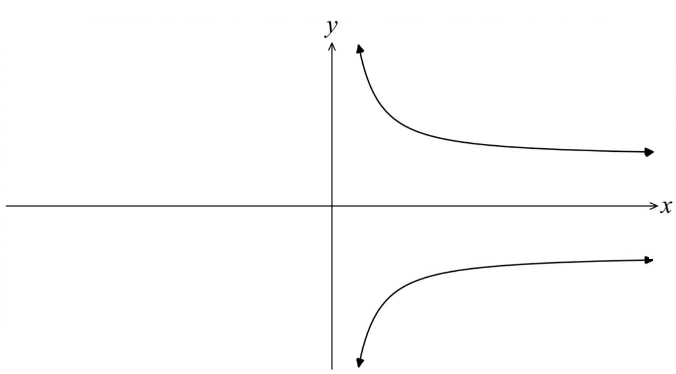
B.



C.



D.



With the symmetry about the x-axis for $|\ y\ | = f(x)$. It has to be B or D.
$f(x) = \arctan x$ has no vertical asymptote.
So B

4 Which of the following is equivalent to $\int_0^{\frac{\pi}{6}} \sin^5 x \cos x \, dx$, after applying the substitution $u = \sin x$?

A. $\int_0^{\frac{\pi}{6}} u^5 \, du$

B. $\int_0^{\frac{1}{2}} u^5 \, du$

C. $-\int_0^{\frac{\pi}{6}} u^5 \, du$

D. $-\int_0^{\frac{1}{2}} u^5 \, du$

Has to be B or D with the change in upper and lower limits.
As the *u*-sub is $u = \sin x$ then $du = \cos x \, dx$
B

5 Given that $f(x) = e^x - 1$ and $y = f^{-1}(x)$, which of the following is an expression for $\frac{dy}{dx}$?

A. $\frac{1}{e^x - 1}$

B. $\frac{1}{x+1}$

C. $\ln x$

D. $\ln(x+1)$

$f(x) = e^x - 1 \Rightarrow x = \ln(1+y)$
$\therefore f^{-1}(x) = \ln(1+x)$

Using:

$$\left(f^{-1}\right)'(a) = \frac{1}{f'\left(f^{-1}(a)\right)}.$$

$\therefore \frac{dy}{dx} = \frac{1}{e^{\ln(x+1)}} = \frac{1}{x+1}$

OR

$f(x) = e^x - 1 \Rightarrow x = \ln(1+y)$
$\therefore y = \ln(1+x) \Rightarrow \frac{dy}{dx} = \frac{1}{1+x}$

6 What is the value of $\arcsin(\cos\alpha)$, where $\pi < \alpha < \dfrac{3\pi}{2}$?

A. $\dfrac{\pi}{2} - \alpha$ B. $\dfrac{3\pi}{2} + \alpha$

C. $\alpha - \dfrac{3\pi}{2}$ D. $\dfrac{3\pi}{2} - \alpha$

As the results are linear, just test the end points π and $\dfrac{3\pi}{2}$.

i.e.

$$\arcsin(\cos\pi) = \arcsin(-1) = -\frac{\pi}{2}$$

$$\arcsin\left(\cos\frac{3\pi}{2}\right) = \arcsin(0) = 0$$

$\therefore$ C

OR

Now $\arcsin(\sin u) = u$ if $-\dfrac{\pi}{2} \le u \le \dfrac{\pi}{2}$

$$\arcsin(\cos\alpha) = \arcsin\left[\cos(2\pi - \alpha)\right]$$

$$= \arcsin\left[\sin\left(\frac{\pi}{2} - (2\pi - \alpha)\right)\right]$$

$$= \arcsin\left[\sin\left(-\frac{3\pi}{2} + \alpha\right)\right]$$

$$= -\frac{3\pi}{2} + \alpha$$

Why?

$$\pi \le \alpha \le \frac{3\pi}{2} \Rightarrow \pi - \frac{3\pi}{2} \le -\frac{3\pi}{2} + \alpha \le \frac{3\pi}{2} - \frac{3\pi}{2}$$

$$\therefore -\frac{\pi}{2} \le -\frac{3\pi}{2} + \alpha \le 0$$

7 If $y = \sin^{-1}\left(\frac{a}{x}\right)$ then which of the following is $\frac{dy}{dx}$, where a is a constant?

A. $-\frac{a}{x^2\sqrt{x^2 - a^2}}$

B. $-\frac{a}{x^2\sqrt{a^2 - x^2}}$

C. $-\frac{a}{|x|\sqrt{x^2 - a^2}}$

D. $-\frac{a}{|x|\sqrt{a^2 - x^2}}$

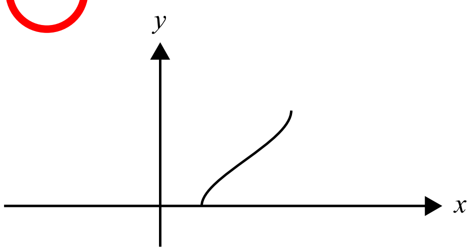
$$y = \sin^{-1}\left(\frac{a}{x}\right) \Rightarrow \frac{dy}{dx} = -\frac{a}{x^2} \times \frac{1}{\sqrt{1 - \left(\frac{a}{x}\right)^2}}$$

From here the answer is A or C

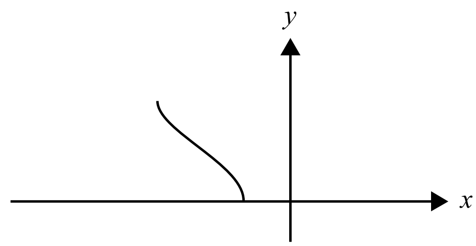
$$\frac{dy}{dx} = -\frac{a}{x^2} \times \frac{1}{\sqrt{\frac{x^2 - a^2}{x^2}}} = -\frac{a}{x^2} \times \frac{|x|}{\sqrt{x^2 - a^2}} = -\frac{a}{|x|\sqrt{x^2 - a^2}}$$

8 Which of the following could be the graph of $y = \arccos(2 - bx)$, where $b > 0$?

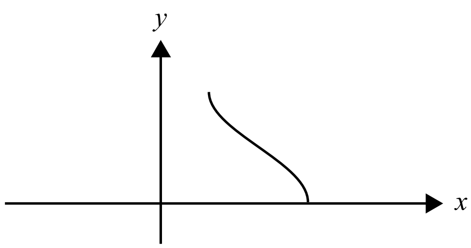
A.



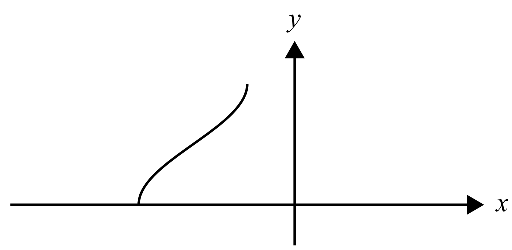
B.



C.



D.



$f(2 - bx) = f\left(-b\left(x - \frac{2}{b}\right)\right)$: A reflection in the y-axis with a horizontal dilation factor of $\frac{1}{b}$

Then a horizontal translation to the right by $\frac{2}{b}$ units

9 What is the domain of f where $f(x) = \cos^{-1}(\ln(bx))$, where $b > 0$?

A. $\left[\frac{1}{b}, \frac{e}{b}\right]$

B. $\left[\frac{1}{b}, \frac{e^{\pi}}{b}\right]$

C. $\left[\frac{1}{be}, \frac{e}{b}\right]$

D. $\left[\frac{1}{be}, \frac{e^{\pi}}{b}\right]$

We need $-1 \le \ln(bx) \le 1 \Rightarrow e^{-1} \le bx \le e$

$\therefore \frac{1}{be} \le x \le \frac{e}{b}$

10 A given function $f(x)$ has an inverse $f^{-1}(x)$.

The derivatives of $f(x)$ and $f^{-1}(x)$ exist for all real numbers x.

The graphs $y = f(x)$ and $y = f^{-1}(x)$ have at least one point of intersection.

Which statement is true for all points of intersection of these graphs?

A. All points of intersection lie on the line $y = x$.

B. None of the points of intersection lie on the line $y = x$.

C. At no point of intersection are the tangents to the graphs parallel.

D. At no point of intersection are the tangents to the graphs perpendicular.

A is false. Some inverse functions will intersect on $y = -x$ e.g. let $f(x) = -x$
B is patently false
C is false. Think about $f(x) = x$
D is true as the statement is false.

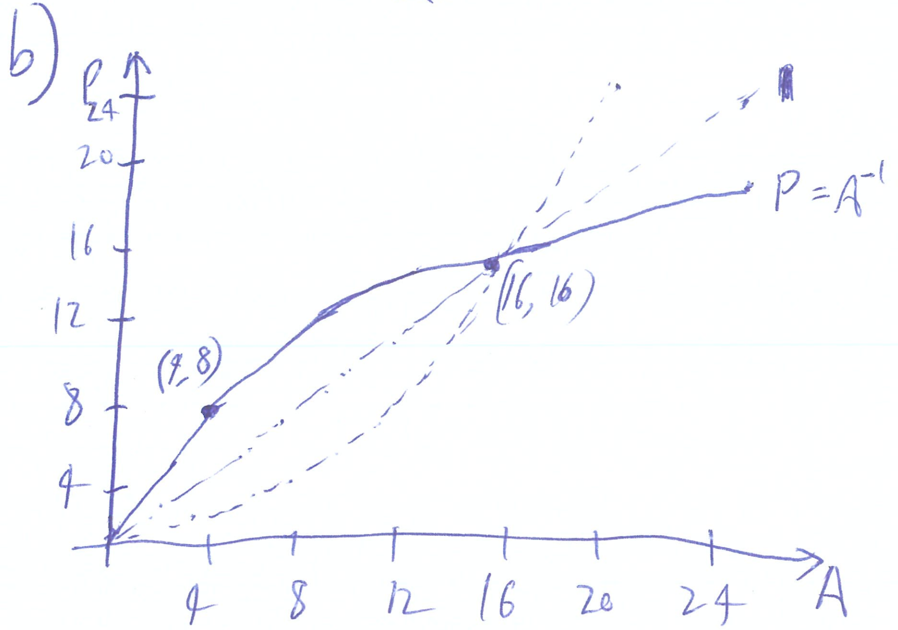
50 students got this question right

Extension 1 Task 3

Section III Part A

11) a) $A(20) = \frac{20^2}{16}$
$= 25$

b)



Plot some point(s) to draw through.

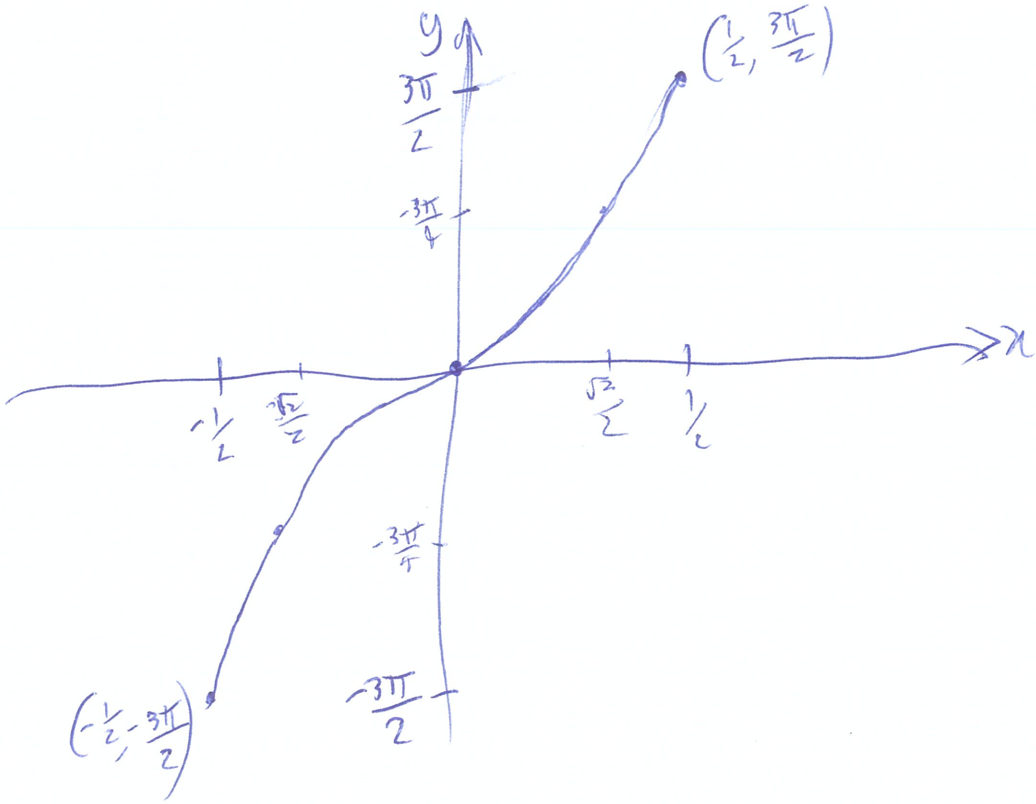
c) $A^{-1}(4) = 8$ means that a square of area 4 has perimeter 8.

The keyword here is "context", which indicates you need to refer to the real world application of the formula.

2

12.

$2x$	-1	$-\frac{\sqrt{2}}{2}$	0	$\frac{\sqrt{2}}{2}$	1
x	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{4}$	0	$\frac{\sqrt{2}}{4}$	$\frac{1}{2}$
$\arcsin(2x)$	$-\frac{\pi}{2}$	$-\frac{\pi}{4}$	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$
$3\arcsin(2x)$	$-\frac{3\pi}{2}$	$-\frac{3\pi}{4}$	0	$\frac{3\pi}{4}$	$\frac{3\pi}{2}$



Be careful with contracting or expanding. This was mostly done well. A table of values can help.

13. a) $RHS = (x+a)^2 + b^2$

$= x^2 + 2ax + (a^2+b^2)$

$LHS = x^2 + 4x + 5$

So $2a = 4$ Compare coefficients

$a = 2.$

Then $a^2 + b^2 = 5$

$b^2 = 5 - 2^2$

$= \pm 1$

$\therefore a = 2,\ b = \pm 1.$ (and $x^2+4x+5 = (x+2)^2 + 1^2$).

b) $\int \frac{1}{x^2+4x+5}\,dx = \int \frac{1}{u^2+1^2}\,du$ Let $u = x+2$

$du = dx$

(from (a))

$= \arctan(u) + C$

$= \arctan(x+2) + C.$

ALWAYS check how a previous part can help the current part.

Some students need to become more familiar with the standard integrals, so you can find the pattern quickly.

14 a) $f(x) = \pi + \arccos(2x-1) - 2\arccos(\sqrt{x})$ for $x \in [0,1]$

$\frac{d}{dx}\left(\arccos(2x-1)\right) = \frac{dy}{du} \times \frac{du}{dx}$

Let $u = 2x-1$

$\frac{du}{dx} = 2$

$\frac{dy}{du} = \frac{1}{\sqrt{1-u^2}}$

$= \frac{2}{\sqrt{1-u^2}}$

$= \frac{2}{\sqrt{1-(2x-1)^2}}$

$= \frac{2}{\sqrt{-4x^2+4x}}$

$= \frac{1}{\sqrt{-x^2+x}}$

$\frac{d}{dx}\left(2\arccos(\sqrt{x})\right) = \frac{dy}{du} \times \frac{du}{dx}$

Let $u = \sqrt{x}$

$\frac{du}{dx} = \frac{1}{2\sqrt{x}}$

$\frac{dy}{du} = \frac{2}{\sqrt{1-u^2}}$

$= \frac{2}{2\sqrt{x}\sqrt{1-x}}$

$= \frac{1}{\sqrt{x-x^2}}$ as above.

$\therefore f'(x) = 0$

Recognise the chain rule straight away.
Don't leave out terms on each line just to save writing.

b) We know $f(x) = C$ is $f'(x) = 0$ on the domain.

Try $f(0) = \pi + \arccos(-1) - 2\arccos(0)$

$= \pi + \pi - 2\left(\frac{\pi}{2}\right)$

$= \pi$.

$\therefore f(x) = \pi$ on the domain.

Done well.
Again use part (a), and be familiar with the meaning of the derivative.

15. a) Notice that on $[0, \frac{\pi}{2})$ that $\cos x$ goes from 1 to 0.

So its reciprocal, $\sec x$ goes from $\frac{1}{1}$ to $\lim_{x \to \frac{\pi}{2}} \frac{1}{\cos x} = \infty$.

$\therefore$ the domain is $1 \le x < \infty$

or $[1, \infty)$.

Notice the round parenthesis on the end.

b) $f(x) = \sec x$

i.e. $y = \sec x$

Swap x and y for the inverse.

$$x = \sec y$$
$$= \frac{1}{\cos y}$$

So $\cos y = \frac{1}{x}$

Take $\cos^{-1}$ of both sides

$$y = \cos^{-1} x = f^{-1}(x).$$

16 Use the substitution $x = \cot\theta$ to evaluate $\displaystyle\int \frac{1}{(x^2+1)^2}\,dx$. **4**

You may use without proof that $\dfrac{d}{dx}(\cot x) = -\operatorname{cosec}^2 x$.

$x = \cot\theta$ so $dx = -\operatorname{cosec}^2\theta\, d\theta$

$$I = \int \frac{1}{(x^2+1)^2}dx$$

$$= \int \frac{-1}{((\cot\theta)^2+1)^2} . \operatorname{cosec}^2\theta\, d\theta$$

$$= \int \frac{-1}{(\csc\theta)^2} d\theta$$

$$= -\int (\sin\theta)^2 d\theta$$

$$= \frac{1}{2}\int (\cos 2\theta - 1) d\theta$$

$$= \frac{1}{2}\left[\frac{1}{2}\sin 2\theta - \theta\right] + C$$

$$= \frac{1}{2}\left[\frac{\cot\theta}{(\cot\theta)^2+1} - \theta\right] + C$$

$$= \frac{1}{2}\left[\frac{x}{x^2+1} - \cot^{-1} x\right] + C+$$

Many candidates failed to correctly differentiate the given substitution.

One mark was lost for not putting the answer back in terms of x.

Half a mark was lost for not simplifying the re-substitution.

17 Use the substitution $u = x\ln x$ to evaluate $\displaystyle\int_1^2 \frac{\ln x^2 + 2}{(x\ln x + 1)^2}\,dx$. **4**

$u = x\ln x$ so $du = \left(x.\frac{1}{x} + \ln x\right)dx$ when $x = 1$, $u = 0$, and when $x = 2$, $u = 2\ln 2$

$= (1 + \ln x)dx$

$$I = \int_1^2 \frac{\ln(x^2)+2}{(x\ln x+1)^2}dx = \int_1^2 \frac{2(\ln x+1)}{(x\ln x+1)^2}dx$$

$$= \int_0^{2\ln 2} \frac{2}{(u+1)^2}du$$

$$= 2\int_0^{2\ln 2}(u+1)^{-2}du$$

$$= 2\left[\frac{-1}{u+1}\right]_0^{2\ln 2}$$

$$= 2\left[1 - \frac{1}{1+2\ln 2}\right]$$

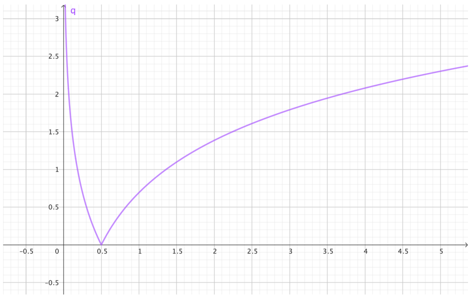
$$= \frac{4\ln 2}{1+2\ln 2} \approx 1.16188$$

Many candidates failed to correctly differentiate the given substitution.
Otherwise this was generally well answered.

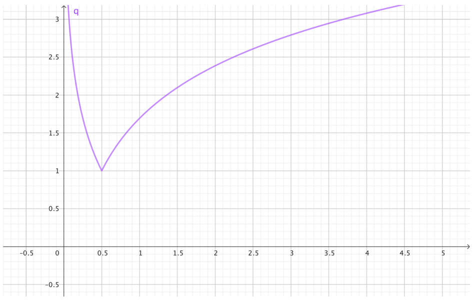
Several candidates read $\ln x^2$ as $(\ln x)^2$; they were given marks for any correct working even though it was leading nowhere.]

18 Consider the function h: $h(x) = |\ln(2x)| + 1, 0 < x \le \lambda$, where $\lambda \in \mathbb{R}$.

(a) By means of a simple graph, show that the maximum value of λ for which the inverse function of h to exist is $\lambda = \frac{1}{2}$. **1**



$y = |\ln(2x)|$



$y = |\ln(2x)| + 1$

Domain $\{x: x > 0\}$
Range $\{y: y \ge 1\}$

Clearly $h(x)$, with domain $\{x: 0 < x \le \lambda\}$ is one-to-one only until $\lambda = ½$ (horizonal line test), and hence may be inverted to a function in this domain.

Part marks were lost for not mentioning either one-to-one or the horizontal line test.

(b) Let $\lambda = \frac{1}{2}$.

(i) Find $h^{-1}(x)$ and state its domain. **3**

Swap x and y: $x = |\ln(2y)| + 1$

$x - 1 = \ln(2y)$ or $1 - x = \ln(2y)$

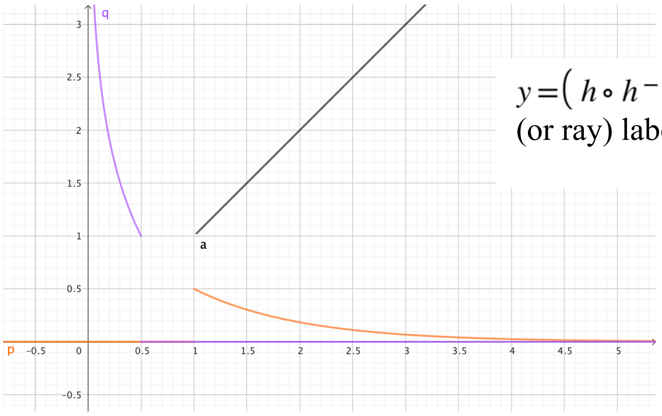
$y = \frac{e^{x-1}}{2}$ or $y = \frac{e^{1-x}}{2}$

Range is $\{y: 0 < y \le \frac{1}{2}\}$, so the inverse is $y = \frac{e^{1-x}}{2}$, with Domain $\{x: x \ge 1\}$

Many candidates chose the wrong branch, or the wrong domain, and so di not gain marks.

18 (continued)

(b) (ii) Sketch the graph of $y = \left(h \circ h^{-1}\right)(x)$. **2**



$y = \left(h \circ h^{-1}\right)(x)$ is the line (or ray) labelled a.

One mark was awarded for the whole line $y = x$, and for the graph $y = |x| + 1$.

The diagonal from (0, 0) to (1, 1) received no marks as the domain and range do not match their answer.

(iii) Find the solution set for $h(x) = h^{-1}(x)$. **1**

The solution set is ϕ, the empty set (by inspection).

Many candidates failed to notice that the domains do not overlap.

Overall, many candidates need to make a greater effort at presentation of their answers. The marker should not have to search amongst illegible scrawling to find something to award a mark for.

Similarly several candidates need to make their written characters distinct. For instance a "4" should not look like "u", and such like.

End of solutions