Week 15/16
Term 4
2023

HAWKER COLLEGE
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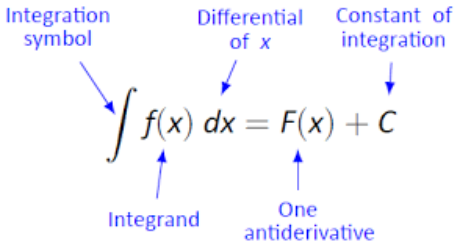
MM2: Introduction to Differential Calculus

Goals



This brief we are:

- Investigating primitive functions and their application
- Reviewing this and previous briefs since last test in preparation for the final test for the unit.

Theoretical Components

Knowledge Checklist:

- what is a rate?
- constant rates
- variable rates
- average rates of change
- instantaneous rates of change
- interpret graphs that illustrate rates of change
- equations of tangents
- what is a limit?
- evaluating limits
- what is a gradient function?
- what is the x-intercept of a gradient function?
- power rule
- finding gradient functions by sketching
- finding gradient functions by using the rule
- finding gradient functions using your CAS
- sketching polynomials

View:
https://youtu.be/MMv-027KEqU

Practical Components

Do the following questions from **Chapter 10 – Antidifferentiation (integration)** (pdf – GC). Organise your solutions neatly in your exercise book.

Ex 10A Antidifferentiation

- Qs 2 (a, c, e, h), 4 (a, d, g, j), 7 (a, c, e), 8

Ex 10B Deriving the original function from the gradient function

- Qs 1, 3, 5, 6, 7, 9, 10,11

Investigation

See following page. Also, remember to prepare hand written double sided A4 summary sheet to be submitted with the test.

QFO

Quiz/Forum/Other

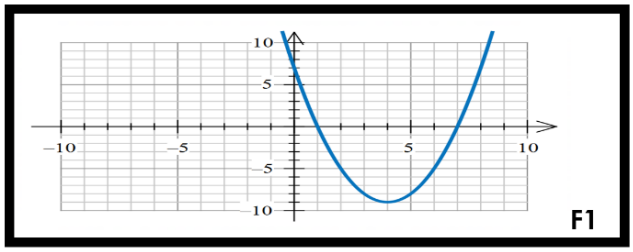
Mathspace: Revision - https://mathspace.co/student/tasks/CurriculumCustomTask-766300/

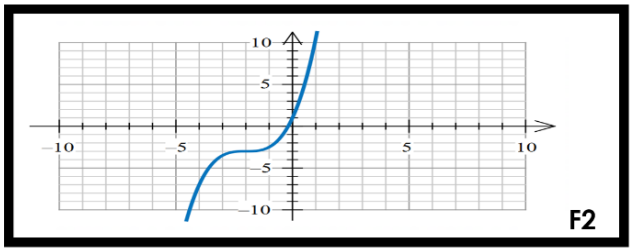
Don't forget that your Term 4 Journal Entries (including Week 9-10, Week 11, Week 12, Week 13-14, and Week 15-16) are all due Monday Week 16.

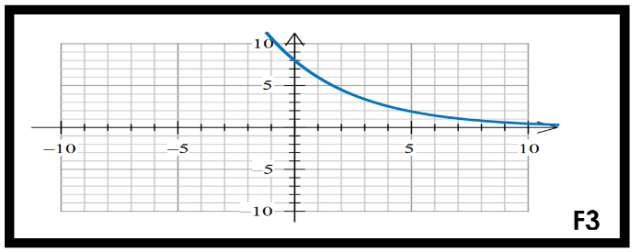
2023 MM2 Week 15-16 Investigation

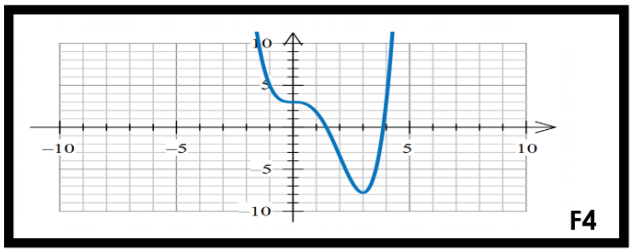
You may complete this task in pairs (put both your names on the submission).

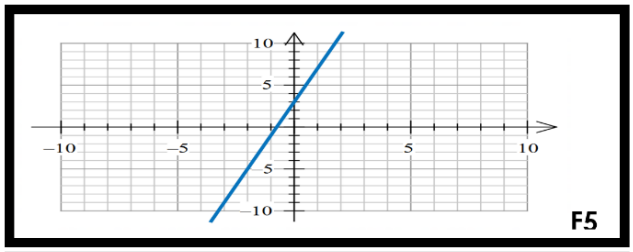
Attached are 12 function graphs, 12 derivative graphs and descriptions for each. Cut out the puzzle pieces and **match the function with its derivative and their descriptions**. Paste on an A3 piece of paper (available from the maths staffroom). Or complete and submit the digital copy.

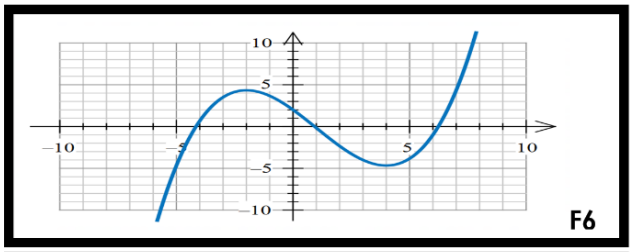


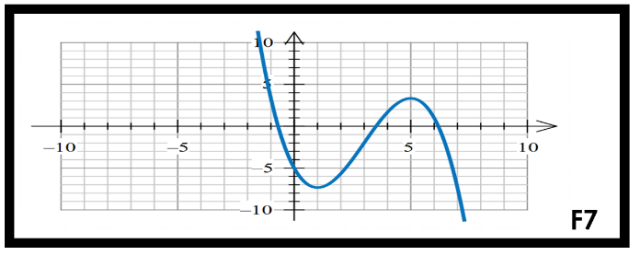


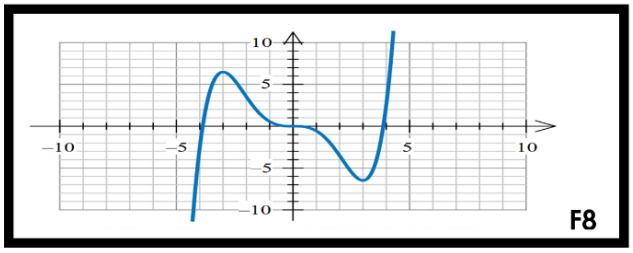


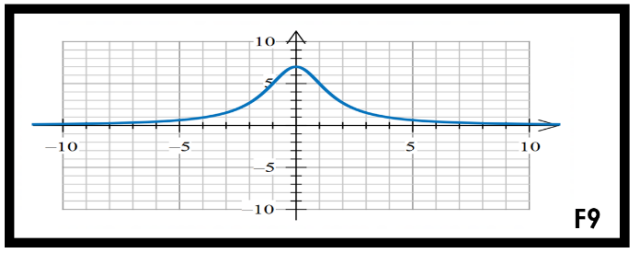


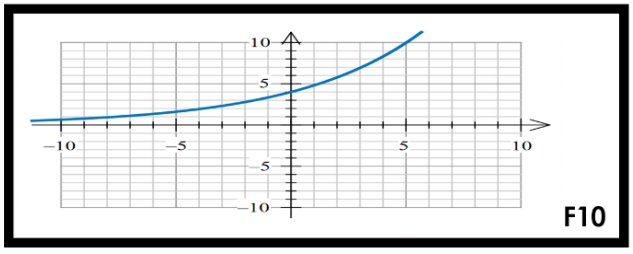


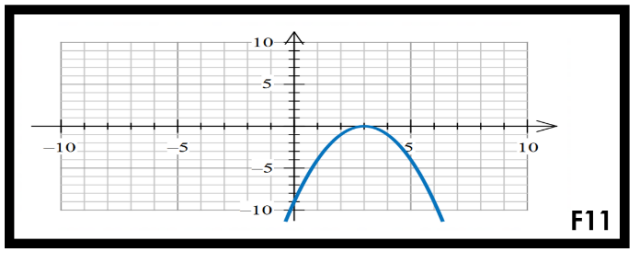


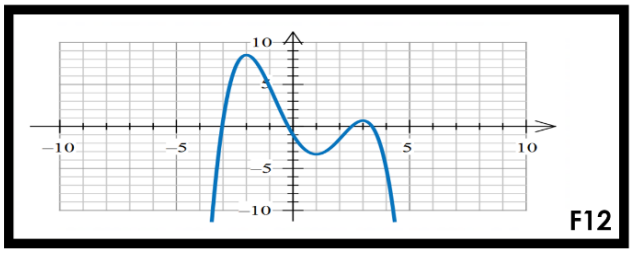












DESCRIPTION OF FUNCTION

This is a [redacted] function with two stationary points and is increasing between these two points.

f1

DESCRIPTION OF FUNCTION

This is a cubic function with a single stationary point.

f2

DESCRIPTION OF FUNCTION

The equation for this function is a quadratic with only one distinct root.

f3

DESCRIPTION OF FUNCTION

This is the graph of a linear function.

f4

DESCRIPTION OF FUNCTION

[redacted] An even function, with a positive leading coefficient and two stationary points.

f5

DESCRIPTION OF FUNCTION

[redacted] This is an odd function that is decreasing on the interval [-3,3] and increasing elsewhere.

f6

DESCRIPTION OF FUNCTION

[redacted] This even function is decreasing when $x \leq 4$, and increasing when $x \geq 4$.

f7

DESCRIPTION OF FUNCTION

[redacted] This is an odd function with a positive leading coefficient and two stationary points.

f8

DESCRIPTION OF FUNCTION

[redacted] This is an even function with three turning points.

f9

DESCRIPTION OF FUNCTION

This function has a maximum at $x=0$ and a horizontal asymptote of $y=0$.

f10

DESCRIPTION OF FUNCTION

This function is always decreasing and is asymptotic to the horizontal axis.

f11

DESCRIPTION OF FUNCTION

This function is always increasing and is never negative.

f12

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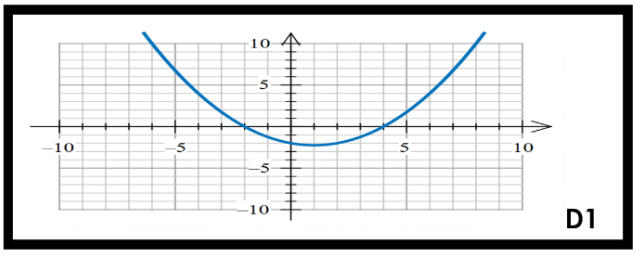
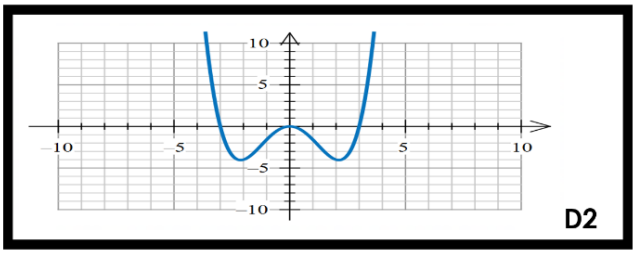
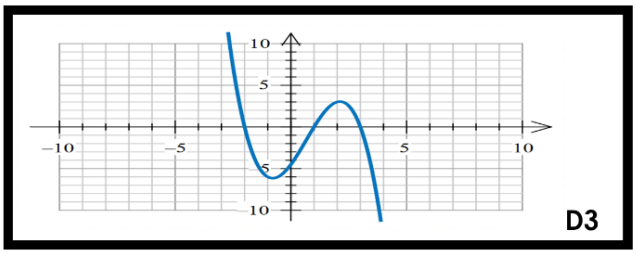

D1


D2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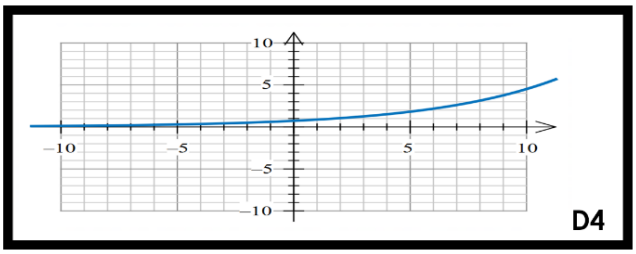
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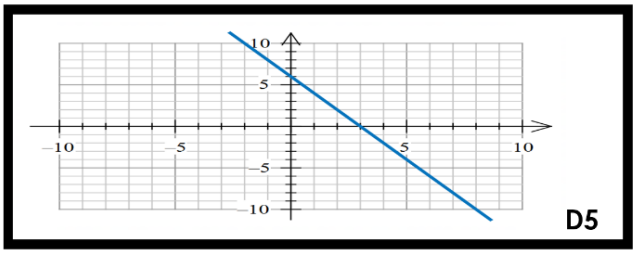
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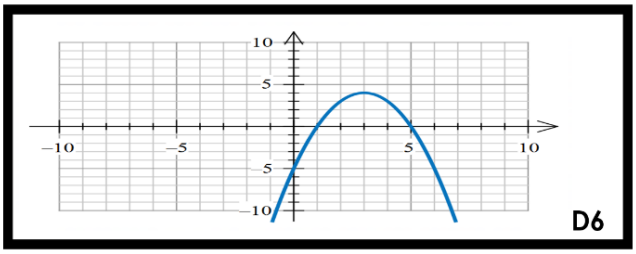
D6

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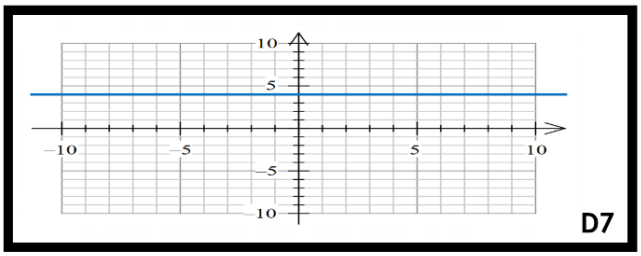
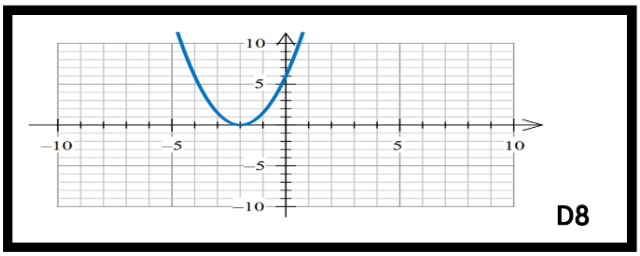

D7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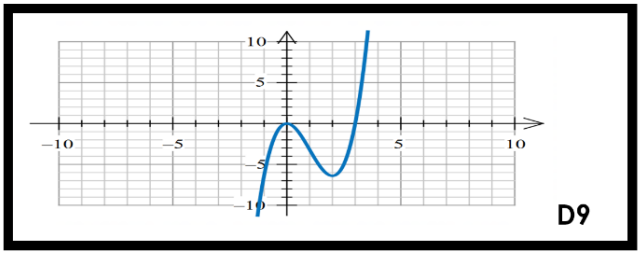
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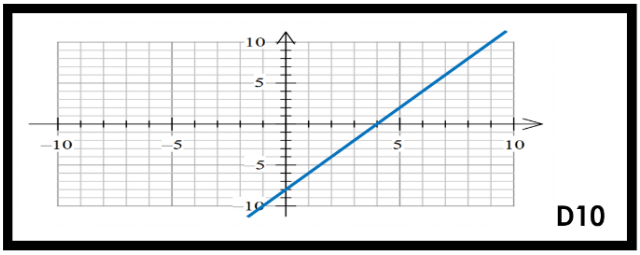
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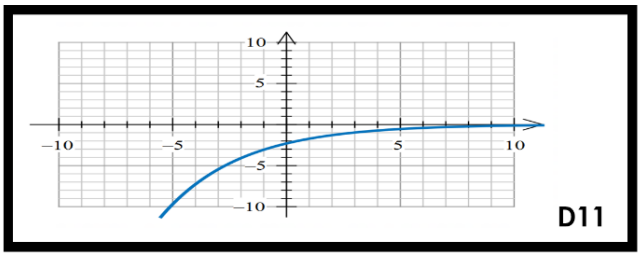
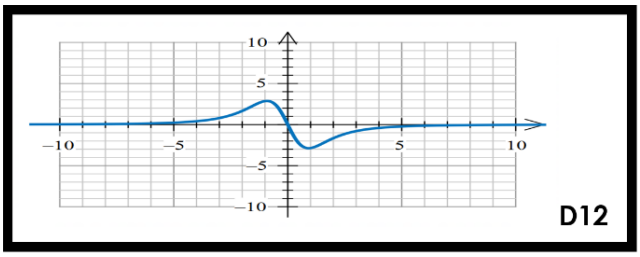

D11


D12

DESCRIPTION OF DERIVATIVE

This derivative graph has an always positive and increasing slope.

d1

DESCRIPTION OF DERIVATIVE

This derivative function has zeros at x=-2, 1 and 3.

d2

DESCRIPTION OF DERIVATIVE

The graph of this derivative is not positive for all x in [–3, 3], and is symmetric to the y-axis.

d3

DESCRIPTION OF DERIVATIVE

This derivative graph is always greater or equal to zero.

d4

DESCRIPTION OF DERIVATIVE

This derivative graph is a quadratic with a negative leading coefficient.

d5

DESCRIPTION OF DERIVATIVE

This derivative graph has a horizontal asymptote and passes through the origin.

d6

DESCRIPTION OF DERIVATIVE

This derivative function is always increasing yet remains negative.

d7

DESCRIPTION OF DERIVATIVE

This derivative graph has a constant negative slope.

d8

DESCRIPTION OF DERIVATIVE

This derivative graph forms a line with a gradient of zero.

d9

DESCRIPTION OF DERIVATIVE

This derivative is an odd function with two turning points and is decreasing between these two points.

d10

DESCRIPTION OF DERIVATIVE

This derivative graph is a parabola with an axis of symmetry at x=1.

d11

DESCRIPTION OF DERIVATIVE

This derivative graph is a line that has a positive slope.

d12