

# Sheet 1

MA180/MA185/MA190, Graham Ellis, Semester 1 2018/19

ID Number: CHECKING ALL VARIANTS  
 Open To: Mon 01 Oct 2018 18:00:00 IST  
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This Problem Sheet 1(a) is designed to help you with the first algebra question and first calculus question on the end of module exam paper. Please do ask your staff tutor for help with the problems. Submitted answers will form part of your continuous assessment. Some of the questions are quite hard so don't worry if you can't tackle these. (If you get at least three of the questions correct then you are on course for a pass in the continuous assessment!)

1	Calculate $6 \times 9 \pmod{12}.$ Enter your answer as an integer in the range 0, 1, ..., 11.	_____
	Calculate $7 \times 9 \pmod{12}.$ Enter your answer as an integer in the range 0, 1, ..., 11.	_____
	Calculate $7 \times 8 \pmod{12}.$ Enter your answer as an integer in the range 0, 1, ..., 11.	_____
	Calculate $-7 \times 8 \pmod{12}.$ Enter your answer as an integer in the range 0, 1, ..., 11.	_____
2	Calculate $2 * 7^{-1} \pmod{26}$ . Enter your answer as an integer in the range 0,1,...,25.	_____
	Calculate $3 * 5^{-1} \pmod{16}$ . Enter your answer as an integer in the range 0,1,...,25.	_____
	Calculate $9 * 9^{-1} \pmod{26}$ . Enter your answer as an integer in the range 0,1,...,25.	_____
	Calculate $9 * 5^{-1} \pmod{26}$ . Enter your answer as an integer in the range 0,1,...,25.	_____
	Calculate $4 * 5^{-1} \pmod{26}$ . Enter your answer as an integer in the range 0,1,...,25.	_____
	Calculate $4 * 5^{-1} \pmod{26}$ . Enter your answer as an integer in the range 0,1,...,25.	_____
	Calculate $12 * 7^{-1} \pmod{26}$ . Enter your answer as an integer in the range 0,1,...,25.	_____
	Calculate $13 * 15^{-1} \pmod{26}$ . Enter your answer as an integer in the range 0,1,...,25.	_____
	Calculate $14 * 17^{-1} \pmod{26}$ . Enter your answer as an integer in the range 0,1,...,25.	_____

	Calculate $4 * 3^{-1} \pmod{26}$ . Enter your answer as an integer in the range 0,1,...,25.	_____
3	Fill in the blank in the following ISBN. 0-9-850718-6 Enter an integer.	_____
	Fill in the blank in the following ISBN. 0-19-850_18-6 Enter an integer.	_____
	Fill in the blank in the following ISBN. 0-19-85071_-8 Enter an integer.	_____
	Fill in the blank in the following ISBN. 0-19-850717-_ Enter an integer.	_____
	Fill in the blank in the following ISBN. 0-19-85071_-1 Enter an integer.	_____
	Fill in the blank in the following ISBN. 0-19-850715-_ Enter an integer.	_____
	Fill in the blank in the following ISBN. 0-19-85071_-3 Enter an integer.	_____
	Fill in the blank in the following ISBN. 0-19-850714-_ Enter an integer.	_____
	Fill in the blank in the following ISBN. 0-387-9429_-9 Enter an integer.	_____
	Fill in the blank in the following ISBN. 0-387-94293-_ Enter an integer.	_____
	Fill in the blank in the following ISBN. 0-387-9429_-7 Enter an integer.	_____

	<p>Fill in the blank in the following ISBN.</p> <p>0-387-94294-<u>  </u></p> <p>Enter an integer.</p>	_____
	<p>Fill in the blank in the following ISBN.</p> <p>0-387-94295-<u>  </u></p> <p>Enter an integer.</p>	_____
	<p>Fill in the blank in the following ISBN.</p> <p>0-387-9429<u>  </u>-5</p> <p>Enter an integer.</p>	_____
	<p>Fill in the blank in the following ISBN.</p> <p>3-540-9429<u>  </u>-9</p> <p>Enter an integer.</p>	_____
	<p>Fill in the blank in the following ISBN.</p> <p>3-540-94293-<u>  </u></p> <p>Enter an integer.</p>	_____
	<p>Fill in the blank in the following ISBN.</p> <p>3-540-9429<u>  </u>-7</p> <p>Enter an integer.</p>	_____
	<p>Fill in the blank in the following ISBN.</p> <p>3-540-94294-<u>  </u></p> <p>Enter an integer.</p>	_____
	<p>Fill in the blank in the following ISBN.</p> <p>3-540-9429<u>  </u>-5</p> <p>Enter an integer.</p>	_____
	<p>Fill in the blank in the following ISBN.</p> <p>3-540-94295-<u>  </u></p> <p>Enter an integer.</p>	_____
	<p>Fill in the blank in the following ISBN.</p> <p>3-540-9429<u>  </u>-3</p> <p>Enter an integer.</p>	_____
	<p>Fill in the blank in the following ISBN.</p> <p>3-<u>  </u>40-94296-3</p> <p>Enter an integer.</p>	_____
4	<p>Use the Euclidean algorithm to determine <math>15^{-1} \pmod{167}</math>.</p> <p>Enter your answer as an integer in the range <math>0, 1, \dots, 166</math>.</p>	_____
	<p>Use the Euclidean algorithm to determine <math>16^{-1} \pmod{167}</math>.</p> <p>Enter your answer as an integer in the range <math>0, 1, \dots, 166</math>.</p>	_____

	Use the Euclidean algorithm to determine $18^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $19^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $20^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $22^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $23^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $25^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $26^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $27^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $29^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $30^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $31^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $32^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
	Use the Euclidean algorithm to determine $33^{-1} \pmod{167}$ . Enter your answer as an integer in the range $0, 1, \dots, 166$ .	_____
5	<p>The following cipher text was produced using an affine enciphering function</p> $f: \mathbb{Z}_{37} \rightarrow \mathbb{Z}_{37}, x \mapsto \alpha x + \beta$ <p>on single letter message units over the 37-letter alphabet</p> $0, 1, 2, \dots, 9, A = 10, B = 11, \dots, Z = 35, \_ = 36$ <p>where underscore represents a blank. The enciphering program (with changed enciphering key) can be downloaded from:</p> <p><a href="http://hamilton.nuigalway.ie/teachingWeb/CSalgebra/cryptosystemSingle37.c">http://hamilton.nuigalway.ie/teachingWeb/CSalgebra/cryptosystemSingle37.c</a></p> <p>The last nine characters of plain text are: COMPUTING</p> <p>Determine the <b>second word</b> of the original plain text and carefully enter it as your answer. The answer is upper/lower-case sensitive</p>	

1	<p>2G106I4E7Y04I2G14I2LSLI90LI9027TL9B0 HIY02G106I2G1T0E604EX1T90SE4J72L9B</p> <p>2G10NTL2LYG04I2G14I2LSLI90LI9027TL9 BOHIY02G106I2G1T0E604EX1T90SE4J72L9B</p> <p>OEU_72M_C2OEUC2OLGL2J_252J_OVALJ7_82 H.OEU_02OEUA_Q0_CQNUAJ_GQCXVOLJ7</p> <p>I.MQ8LGUUGSRIQASIMASIGPGSRQSUSRQIZLG RJQWS1QI.MQ2SI.MLQ72QA75MLRQP7AOZIGRJ</p> <p>K1OSROWOANUKO7SCUK1OCUKIRIUTSUWUTSK0N ITLSYU3SK1OS4UK1ONS94SC97ONTSR9CQ0KITL</p> <p>FOHJYZHKFJBKFOHBKFE0EK1JKLK1JF5ZE1YJMK PJFOHJ7KFOHZJS7JBSRHZ1J0SBI5FE1Y</p> <p>5_GR4G2LP2GYRKE5_GKE5IFIE2RE1E2R5O4I2 HRPENR5_GRZE5_G4RLZRKLYG42RFLK3O5I2H</p> <p>47HU4NIZG_UFI47HFI4G_GIOUI6IOU4DNGOZU VIWU47HUQI47HNUXQUFX8HNOU_XF5D4GOZ</p>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
6	<p>[This is a challenge problem, and only intended for those who like a challenge.]</p> <p>D. J. Lewis states in his paper</p> <ul style="list-style-type: none"> <li>• <i>Diophantine equations: p-adic methods</i>, pp. 25-75 of <i>Studies in Number Theory</i>, Math. Assoc. Amer. 1969</li> </ul> <p>that there are at most 18 pairs of integers <math>(a, b)</math> that satisfy the equation</p> $a^3 - 117b^3 = 5$ <p>but that the exact number of such pairs is unknown.</p> <p>Determine the exact number of integer pairs <math>(a, b)</math> that satisfy the equation and enter this number as an integer.</p> <p>A review of Lewis's paper is available here: <a href="http://hamilton.nuigalway.ie/MathReview.pdf">http://hamilton.nuigalway.ie/MathReview.pdf</a></p>	<hr/>
7	<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 + 5x + 4}{x^2} ?$ <p>(a) <math>(-4,0), (-1,0)</math></p> <p>(b) <math>(4,0), (1,0)</math></p> <p>(c) <math>(0,-1), (0,-4)</math></p> <p>(d) <math>(4,0), (-1,0)</math></p> <p>(e) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e</p>

What are the  $x$ -intercepts of the function

$$f(x) = \frac{x^2 - 7x - 8}{x^2} ?$$

- (a) (8,0), (-1,0)
- (b) (-8,0), (1,0)
- (c) (7,0), (1,0)
- (d) (-8,0), (-1,0)
- (e) None of the above.

a /  b /   
c /  d /  e

What are the  $x$ -intercepts of the function

$$f(x) = \frac{x^2 - 7x - 8}{x^4} ?$$

- (a) (8,0), (-1,0)
- (b) (-8,0), (1,0)
- (c) (7,0), (1,0)
- (d) (-8,0), (-1,0)
- (e) None of the above.

a /  b /   
c /  d /  e

What are the  $x$ -intercepts of the function

$$f(x) = \frac{x^2 - 7x + 6}{x^2} ?$$

- (a) (-6,0), (-1,0)
- (b) (6,0), (1,0)
- (c) (2,0), (3,0)
- (d) (-6,0), (1,0)
- (e) None of the above.

a /  b /   
c /  d /  e

<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 + 4x + 3}{x^2 + 1} ?$ <p>(a) (-2,0) (-1,0)  (b) (1,0), (2,0)  (c) (-3,0), (-1,0)  (d) (3,0), (1,0)  (e) None of the above.</p>	<input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e
<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 - 4}{x^2} ?$ <p>(a) (-2,0) (2,0)  (b) (1,0), (2,0)  (c) (-4,0), (4,0)  (d) (3,0), (1,0)  (e) None of the above.</p>	<input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e
<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 - 16}{x^2} ?$ <p>(a) (-2,0) (2,0)  (b) (16,0), (-16,0)  (c) (-4,0), (4,0)  (d) (3,0), (1,0)  (e) None of the above.</p>	<input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e

<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 - 16}{x^2 + 9} ?$ <p>(a) (-2,0) (2,0)            (b) (16,0), (-16,0)            (c) (-4,0), (4,0)            (d) (3,0), (1,0)            (e) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/>  <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e</p>
<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 - 16}{2x^2} ?$ <p>(a) (-2,0) (2,0)            (b) (16,0), (-16,0)            (c) (-4,0), (4,0)            (d) (3,0), (1,0)            (e) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/>  <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e</p>
<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 + 5x + 4}{2x^2} ?$ <p>(a) (-4,0), (-1,0)            (b) (-2,0), (-0.5,0)            (c) (0,-1), (0,-4)            (d) (4,0), (-1,0)            (e) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/>  <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e</p>



<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 - 2x - 3}{x^2} ?$ <p>(a) (-4,0), (-1,0)  (b) (3,0), (-1,0)  (c) (0,-1), (0,-4)  (d) (-3,0), (1,0)  (e) None of the above.</p>	<input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e
<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 - 2x - 3}{2x^2} ?$ <p>(a) (-4,0), (-1,0)  (b) (3,0), (-1,0)  (c) (1.5,0), (-0.5,0)  (d) (-3,0), (1,0)  (e) None of the above.</p>	<input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e
<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 - 9}{x^3 + 8} ?$ <p>(a) (-9,0), (9,0)  (b) (3,0), (-3,0)  (c) (1.5,0), (-0.5,0)  (d) (0,0), (3,0)  (e) None of the above.</p>	<input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e

<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 - 9}{x^2 + 8} ?$ <p>(a) (-9,0), (9,0)            (b) (3,0), (-3,0)            (c) (1.5,0), (-0.5,0)            (d) (0,0), (3,0)            (e) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/>  <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e</p>
<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 + 8x - 9}{x^2 + 8} ?$ <p>(a) (-9,0), (9,0)            (b) (9,0), (1,0)            (c) (9,0), (-1,0)            (d) (-9,0), (1,0)            (e) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/>  <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e</p>
<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 + 6x + 8}{x^2} ?$ <p>(a) (4,0), (-2,0)            (b) (7,0), (1,0)            (c) (4,0), (2,0)            (d) (-4,0), (-2,0)            (e) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/>  <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e</p>

	<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 - 4x + 3}{x^2 - 36} ?$ <p>(a) (3,0), (1,0)  (b) (-3,0), (-1,0)  (c) (-6,0), (6,0)  (d) (36,0), (0,0)  (e) None of the above.</p>	<input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e
	<p>What are the <math>x</math>-intercepts of the function</p> $f(x) = \frac{x^2 - 4x - 21}{x^2 - 36} ?$ <p>(a) (-7,0), (3,0)  (b) (-3,0), (7,0)  (c) (-6,0), (6,0)  (d) (36,0), (0,0)  (e) None of the above.</p>	<input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> <input type="radio"/> c / <input type="radio"/> d / <input type="radio"/> e
§	<p>Does the function</p> $f(x) = \frac{x^2 + 5x + 4}{x^2}$ <p>have a <math>y</math>-intercept?</p> <p>(a) Yes, it has a <math>y</math>-intercept at (0,4)  (b) Yes, it has a <math>y</math>-intercept at (0,-1)  (c) No  (d) None of the above.</p>	<input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> <input type="radio"/> c / <input type="radio"/> d

<p>Does the function</p> $f(x) = \frac{x^2 - 7x - 8}{x^2}$ <p>have a y-intercept?</p> <p>(a) Yes, it has a y-intercept at (0,1)</p> <p>(b) Yes, it has a y-intercept at (0,-8)</p> <p>(c) No</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 - 7x - 8}{x^4}$ <p>have a y-intercept?</p> <p>(a) Yes, it has a y-intercept at (0,1)</p> <p>(b) Yes, it has a y-intercept at (0,-8)</p> <p>(c) No</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 - 7x + 6}{x^2}$ <p>have a y-intercept?</p> <p>(a) Yes, it has a y-intercept at (0,1)</p> <p>(b) Yes, it has a y-intercept at (0,6)</p> <p>(c) No</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 + 4x + 3}{x^2 + 1}$ <p>have a y-intercept?</p> <p>(a) Yes, it has a y-intercept at (0,1)</p> <p>(b) Yes, it has a y-intercept at (0,3)</p> <p>(c) No</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>

<p>Does the function</p> $f(x) = \frac{x^2 - 4}{x^2}$ <p>have a y-intercept?</p> <p>(a) No</p> <p>(b) Yes, it has a y-intercept at (0,-4)</p> <p>(c) Yes, it has a y-intercept at (0,4)</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 - 16}{x^2}$ <p>have a y-intercept?</p> <p>(a) Yes, it has a y-intercept at (0,-16)</p> <p>(b) No</p> <p>(c) Yes, it has a y-intercept at (0,16)</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 - 16}{x^2 + 4}$ <p>have a y-intercept?</p> <p>(a) Yes, it has a y-intercept at (0,-16)</p> <p>(b) Yes, it has a y-intercept at (0,-4)</p> <p>(c) No</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 - 16}{2x^2}$ <p>have a y-intercept?</p> <p>(a) Yes, it has a y-intercept at (0,-16)</p> <p>(b) Yes, it has a y-intercept at (0,-8)</p> <p>(c) No</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>

<p>Does the function</p> $f(x) = \frac{x^2 + 5x + 4}{2x^2}.$ <p>have a y-intercept?</p> <p>(a) No</p> <p>(b) Yes, it has a y-intercept at (0,4)</p> <p>(c) Yes, it has a y-intercept at (0,2)</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 - 2x - 3}{x^2 - 2}$ <p>have a y-intercept?</p> <p>(a) No</p> <p>(b) Yes, it has a y-intercept at (0,1.5)</p> <p>(c) Yes, it has a y-intercept at (0,-3)</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 - 2x - 3}{x^2 - 1}$ <p>have a y-intercept?</p> <p>(a) Yes, it has a y-intercept at (0,3)</p> <p>(b) Yes, it has a y-intercept at (0,-3)</p> <p>(c) No</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 - 9}{x^3 + 1}$ <p>have a y-intercept?</p> <p>(a) No</p> <p>(b) Yes, it has a y-intercept at (0,-3)</p> <p>(c) Yes, it has a y-intercept at (0,-9)</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>

<p>Does the function</p> $f(x) = \frac{x^2 - 9}{x^2 + 3}$ <p>have a y-intercept?</p> <p>(a) No</p> <p>(b) Yes, it has a y-intercept at (0,-3)</p> <p>(c) Yes, it has a y-intercept at (0,-9)</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 + 8x - 9}{2x^2}$ <p>have a y-intercept?</p> <p>(a) No</p> <p>(b) Yes, it has a y-intercept at (0,-4.5)</p> <p>(c) Yes, it has a y-intercept at (0,-9)</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 + 6x + 8}{x^2}$ <p>have a y-intercept?</p> <p>(a) Yes, it has a y-intercept at (0,8)</p> <p>(b) Yes, it has a y-intercept at (0,6)</p> <p>(c) No</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
<p>Does the function</p> $f(x) = \frac{x^2 - 4x + 72}{x^2 - 36}$ <p>have a y-intercept?</p> <p>(a) Yes, it has a y-intercept at (0,-2)</p> <p>(b) Yes, it has a y-intercept at (0,72)</p> <p>(c) No</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>

	<p>Does the function</p> $f(x) = \frac{x^2 - 4x - 8}{x^2 - 4}$ <p>have a y-intercept?</p> <p>(a) No</p> <p>(b) Yes, it has a y-intercept at (0,2)</p> <p>(c) Yes, it has a y-intercept at (0,-8)</p> <p>(d) None of the above.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c / <input type="radio"/> d</p>
9	<p>If <math>f(x) = \cos(x)</math> and <math>g(x) = x^2</math> then:</p> <p>(a) <math>f \circ g</math> is even.</p> <p>(b) <math>f \circ g</math> is odd</p> <p>(c) <math>f \circ g</math> is neither even nor odd.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c</p>
	<p>If <math>f(x) = \sin(x)</math> and <math>g(x) = x^3</math> then:</p> <p>(a) <math>f \circ g</math> is even.</p> <p>(b) <math>f \circ g</math> is odd.</p> <p>(c) <math>f \circ g</math> is neither even nor odd.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c</p>
	<p>If <math>f(x) = \cos(x)</math> and <math>g(x) = \sin(x)</math> then:</p> <p>(a) <math>f \circ g</math> is even.</p> <p>(b) <math>f \circ g</math> is odd.</p> <p>(c) <math>f \circ g</math> is neither even nor odd.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c</p>
	<p>If <math>f(x) = \cos(x)</math> and <math>g(x) = \sin(x)</math> then:</p> <p>(a) <math>g \circ f</math> is even.</p> <p>(b) <math>g \circ f</math> is odd.</p> <p>(c) <math>g \circ f</math> is neither even nor odd.</p>	<p><input type="radio"/> a / <input type="radio"/> b / <input type="radio"/> c</p>
10		



1	<p>Which subset of the following statements is true?</p> <p>(A) If <math>2x = 8</math> then <math>x = 4</math>.</p> <p>(B) If <math>2x \equiv 8 \pmod{12}</math> then <math>x \equiv 4 \pmod{12}</math>.</p> <p>(C) If <math>2x \equiv 8 \pmod{11}</math> then <math>x \equiv 4 \pmod{11}</math>.</p> <p>(D) If <math>5x \equiv 10 \pmod{12}</math> then <math>x \equiv 2 \pmod{12}</math>.</p> <p>(E) If <math>5x \equiv 10 \pmod{12}</math> then <math>x = 2</math>.</p>	<input type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C <input type="checkbox"/> D / <input type="checkbox"/> E
	<p>Which subset of the following statements is true?</p> <p>(A) If <math>3x = 6</math> then <math>x = 2</math>.</p> <p>(B) If <math>3x \equiv 6 \pmod{12}</math> then <math>x \equiv 2 \pmod{12}</math>.</p> <p>(C) If <math>3x \equiv 6 \pmod{11}</math> then <math>x \equiv 2 \pmod{11}</math>.</p> <p>(D) If <math>7x \equiv 2 \pmod{12}</math> then <math>x \equiv 2 \pmod{12}</math>.</p> <p>(E) If <math>7x \equiv 2 \pmod{12}</math> then <math>x = 2</math>.</p>	<input type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C <input type="checkbox"/> D / <input type="checkbox"/> E
	<p>Which subset of the following statements is true?</p> <p>(A) If <math>4x = 8</math> then <math>x = 2</math>.</p> <p>(B) If <math>4x \equiv 8 \pmod{12}</math> then <math>x \equiv 2 \pmod{12}</math>.</p> <p>(C) If <math>4x \equiv 8 \pmod{11}</math> then <math>x \equiv 2 \pmod{11}</math>.</p> <p>(D) If <math>11x \equiv 10 \pmod{12}</math> then <math>x \equiv 2 \pmod{12}</math>.</p> <p>(E) If <math>11x \equiv 10 \pmod{12}</math> then <math>x = 2</math>.</p>	<input type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C <input type="checkbox"/> D / <input type="checkbox"/> E
	<p>Which subset of the following statements is true?</p> <p>(A) If <math>3x = 6</math> then <math>x = 2</math>.</p> <p>(B) If <math>3x \equiv 6 \pmod{15}</math> then <math>x \equiv 2 \pmod{15}</math>.</p> <p>(C) If <math>3x \equiv 6 \pmod{13}</math> then <math>x \equiv 2 \pmod{13}</math>.</p> <p>(D) If <math>4x \equiv 8 \pmod{15}</math> then <math>x \equiv 2 \pmod{15}</math>.</p> <p>(E) If <math>4x \equiv 8 \pmod{15}</math> then <math>x = 2</math>.</p>	<input type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C <input type="checkbox"/> D / <input type="checkbox"/> E

	<p>Which subset of the following statements is true?</p> <p>(A) If <math>5x = 10</math> then <math>x = 2</math>.</p> <p>(B) If <math>5x \equiv 10 \pmod{15}</math> then <math>x \equiv 2 \pmod{15}</math>.</p> <p>(C) If <math>5x \equiv 10 \pmod{13}</math> then <math>x \equiv 2 \pmod{13}</math>.</p> <p>(D) If <math>4x \equiv 8 \pmod{15}</math> then <math>x \equiv 2 \pmod{15}</math>.</p> <p>(E) If <math>4x \equiv 8 \pmod{15}</math> then <math>x = 2</math>.</p>	<input type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C <input type="checkbox"/> D / <input type="checkbox"/> E
11	<p>Use Euler's function <math>\phi(n)</math> to determine the value of <math>5^{6050} \pmod{5733}</math>? (Enter your answer as an integer in the range <math>0, 1, \dots, 5732</math>.)</p>	_____
	<p>Use Euler's function <math>\phi(n)</math> to determine the value of <math>7^{2882} \pmod{2925}</math>? (Enter your answer as an integer in the range <math>0, 1, \dots, 2924</math>.)</p>	_____
	<p>Use Euler's function <math>\phi(n)</math> to determine the value of <math>5^{6050} \pmod{11466}</math>? (Enter your answer as an integer in the range <math>0, 1, \dots, 11465</math>.)</p>	_____
	<p>Use Euler's function <math>\phi(n)</math> to determine the value of <math>11^{20162} \pmod{31850}</math>? (Enter your answer as an integer in the range <math>0, 1, \dots, 31849</math>.)</p>	_____
	<p>Use Euler's function <math>\phi(n)</math> to determine the value of <math>11^{8066} \pmod{12740}</math>? (Enter your answer as an integer in the range <math>0, 1, \dots, 12739</math>.)</p>	_____
<p>You can resubmit your answers any time up to the deadline.</p>		

