

Math SL PROBLEM SET 14

Section A (Short Answer)

1. **(T3.1, T3.2 - N) (CI)** For the following angles (given in degrees), convert the measure to an angle measurement in radians. Leave all answers in terms of π and also record answers correct to 4 decimal places. *(Cirrito 9.7.1, p309)*

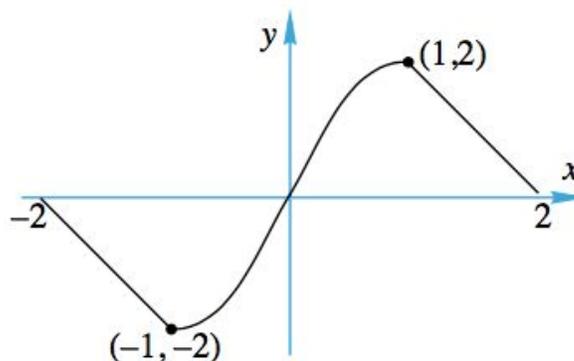
30°	45°	150°	-225°	-90°	285°

2. **(T3.1, T3.2 - N) (CA)** For the following angles (given in radians), convert the measure to an angle measurement in degrees. *(Cirrito 9.7.1, p309)*

$7\pi/6$	$-3\pi/4$	2	$11\pi/15$	$5\pi/2$	$-5\pi/3$

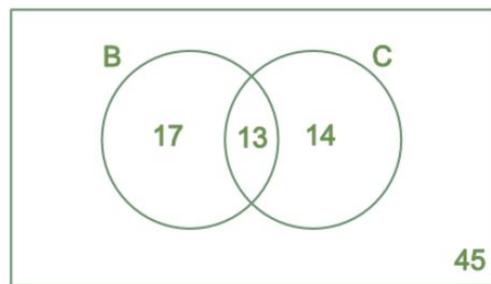
3. **(F2.2, F2.3 - E) (CI)** The graph of $y = f(x)$ is given. Use this graph to sketch the new graphs of the following. Label the intercepts and extrema (maximums and minimums) in the new graphs: *(Cirrito 6.1, p167; Cirrito 6.2, p177; Cirrito 6.3, p183)*

- $y = 1 + f(-x)$
- $y = 2 - f(\frac{1}{2}x)$
- $y = -2 + f(1 - x)$



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4. **(SP5.5 - R) (CI)** The Venn diagram shows students that are studying a Science subject. The Venn diagram shows those studying Biology and Chemistry. *(Cirrito 15.2, p508)*

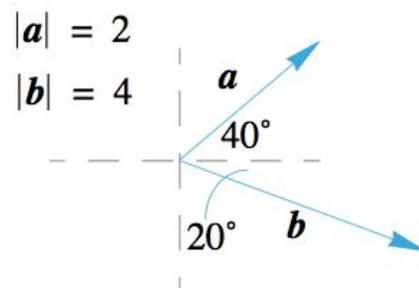


- What is the probability of a student studying Biology if they are also studying Chemistry?
 - What is the probability of a student studying Chemistry if they are also studying Biology?
 - What is the $P(B) \times P(C)$?
 - What is $P(B \text{ and } C)$ according to the information presented in the Venn Diagram?
 - Explain why your answers to Q4c and Q4d are different.
5. **(A1.2, F2.6 - R) (CA)** The population of a certain bacteria grows exponentially and can be modeled by $P(t) = 18(2)^{t/3.5}$ where t is time in hours. *(Cirrito 7.2, p209)*
- What was the population of the bacteria when the observations started?
 - What is the doubling period of this bacteria?
 - What is the hourly growth rate of this population?
 - How many bacteria will be present in 35 hours?
 - When will the bacteria reach a population of 294,900?
 - Let's now make the assumption that the bacteria population was changing continuously. Knowing the doubling period from Q(c), **show that** the equation can also be written using the natural base (e) as $P(t) = 18e^{0.198042 t}$.
6. **(T3.6 - R) (CA)** A triangle has adjacent sides measuring 12 cm and 10 cm and the angle between the sides is 2 radians. *(Cirrito 9.5.4, p300)*
- Draw a diagram, showing this triangle.
 - How many degrees is 2 radians?
 - Determine the measure of the third side of the triangle. Does it matter whether you used the angle measure of radians or degrees to answer this question?)

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7. **(V4.1, V4.2 - N)** (CA) You are given the information about two vectors, \mathbf{a} and \mathbf{b} , and the angle between these two vectors (see the diagram). You know the magnitude (length) of \mathbf{a} is 2 and the magnitude of \mathbf{b} is 4. *(Cirrito 12.4, p410; Cirrito 9.5.4, p300)*

- Draw the diagram in your notes. Draw a third vector that will connect the head of vector \mathbf{a} to the head of vector \mathbf{b} . Label this vector as \mathbf{c} .
- Find the magnitude of vector \mathbf{c} .
- Show that vector \mathbf{c} is equal to vector \mathbf{b} minus vector \mathbf{a} . (i.e. $\mathbf{c} = \mathbf{b} - \mathbf{a}$)



Section B (Extended Response/Investigation)

8. **(A1.2 - E)** (CA) Pattern Set: Use your TI-84 to determine the value of the following logarithms: *(Cirrito 7.4, p221)*

$\log_2 0$	$\log_2 1$	$\log_2 2$	$\log_2 3$	$\log_2 4$	$\log_2 5$	$\log_2 6$
$\log_2 7$	$\log_2 8$	$\log_2 9$	$\log_2 10$	$\log_2 11$	$\log_2 12$	$\log_2 13$
$\log_2 14$	$\log_2 15$	$\log_2 16$	$\log_2 17$	$\log_2 18$	$\log_2 19$	$\log_2 20$

Look for patterns amongst the numbers & outputs:

- Compare $\log_2 3$ and $\log_2 5$ and $\log_2 15$
- Compare $\log_2 3$ and $\log_2 4$ and $\log_2 12$
- Compare $\log_2 4$ and $\log_2 5$ and $\log_2 20$
- Can you see some patterns that will lead to some GENERALIZATIONS that would then in turn allow us to make PREDICTIONS?
 - So, predict the value of (i) $\log_2 48$, (ii) $\log_2 36$, (iii) $\log_2 75$
 - So, predict the value of (i) $\log_2 \left(\frac{1}{3}\right)$, (ii) $\log_2 7.5$, (iii) $\log_2 \sqrt[3]{12}$

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9. (A1.2 - N) (CI) If $\ln(2) = 0.69$ and $\ln(3) = 1.10$ and $\ln(5) = 1.61$, determine the values of:
(Cirrito 7.4, p221)

(a) $\ln(100)$

(b) $\ln(1.5)$

(c) $\ln(150)$

(d) $\ln(0.1)$

(e) $\ln(135)$

(f) $\ln(1.2)$