Math SL PROBLEM SET 38

Section A (Short Answer)

1. **(A1.1 - E) (CA)** Evaluate the following: **(Cirrito 8.1.1, p241)**

   a. $\sum_{k=0}^{13} (2 + 0.3k)$

   b. $\frac{1}{3} + \frac{\sqrt{3}}{12} + \frac{1}{16} + \frac{\sqrt{3}}{64} + \frac{3}{256} + \ldots..$

   c. $2 - 3 + \frac{9}{2} - \frac{27}{4} + \ldots.. - \frac{177147}{1024}$

   d. $11 + 17 + 23 + \ldots.. + 365$

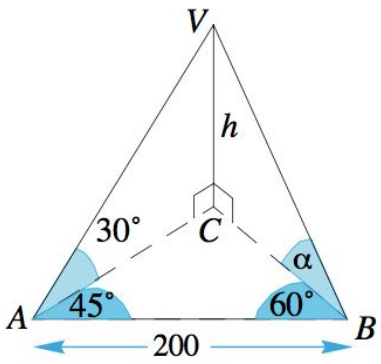
   e. $\lim_{n\to\infty} \sum_{k=1}^{n} 2(\frac{1}{2})^{k-1}$

2. **(SP5.8 - N) (CA)** A bag consists of 6 white cubes and 10 black cubes. Cubes are withdrawn one at a time, with replacement. Find the probability that after 4 draws **(Cirrito 16.3.4, p544)**

   a. all the cubes are black;
   b. there are at least 2 white cubes;
   c. there are at least 2 white cubes given that there was at least one white cube.

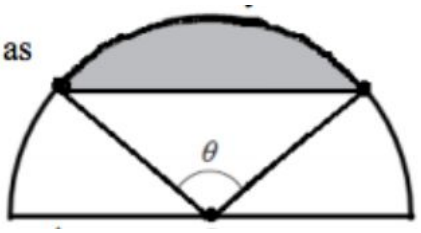
3. **(T3.6 - E) (CA)** For the triangle prism shown in the diagram, find: **(Cirrito 9.3, p283)**

   a. The value of h.
   b. The value of α
   c. The angle that the plane ABV makes with the base ABC.



4. **(T3.1 - N) (CI)** The semi circle with center O is shown and has an area of exactly 24 cm^2. **(Cirrito 9.7.3, p311)**

   a. Show that the shaded area can be expressed as $\frac{24\theta}{\pi} - \frac{24}{\pi}sin\theta$.
   b. If $\theta = \frac{2\pi}{3}$, find the exact area of the shaded region.



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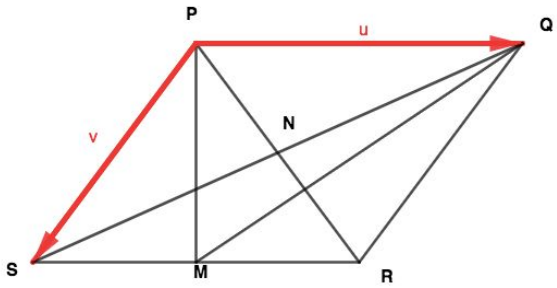
5. **(V4.1 - N) (CI)** Vectors ***u*** and ***v*** for two sides of the parallelogram *PQRS*. Express each of the following vectors in terms of ***u*** and ***v***: **(Cirrito 12.3, p415)**



   a. PR
   b. ***PM*** (where *M* is the midpoint of *RS*)
   c. QS
   d. QN

6. **(T3.3 - N) (CI)** You know that $\sin^{-1}(\frac{3}{4})$ is approximately equal to 50°. Hence, determine the values of: **(Cirrito 10.2.2, p332)**

   a. cos(50°) b. tan(50°) c. sin(100°) d. cos(100°) e. sin(40°) f. cos(80°)

Section B (Extended Response/Investigation)

7. **(C6.2 - N) (CI)** **(Cirrito 19.1.2, p604)**

   (a) For the following polynomial functions, determine the equation of their derivative function:

   i. $f(x) = 3x^4 - x^3 + 5$ ii. $g(x) = -\frac{1}{2}x^2 + x + 6$ iii. $h(x) = \sqrt{2}x^5 - 4\sqrt{3}x^2 - \frac{\pi}{2}$

   (b) For the following **derivatives** of polynomial functions, determine the equation of the original function:

   i. $\frac{dy}{dx} = 2x + 5$ ii. $\frac{dy}{dx} = 6x^2 + 4x - 7$ iii. $\frac{dy}{dx} = 4x^3 - 3x$

8. **(C6.1, C6.2 - N) (CI)** Find the equation of the line that is tangent to each curve at the given *x* value: **(Cirrito 19.2.1, p609)**

   a. $y = x^2 - 5x + 4$ where $x = 3$
   b. $y = 4x^2 + x - 5$ where $x = -\frac{1}{2}$
   c. $f(x) = x^3 - 5x^2 + 6x - 7$ where $x = -1$
   d. $g(x) = 5x^4 + x^3 - 6x$ where $x = 3$