Math SL PROBLEM SET 26

Section A (Short Answer)

1. (**T3.4 - N**) (**CA**) Graph the function $f(x) = \tan(x)$ on the domain of $-180° \leq x \leq 360°$. Label the x- and y-intercept(s) as well as the asymptotes. Hence, sketch the following transformed tangent functions and list the transformations being described by the equation. **(Cirrito 16.3.2, p341)**

   a. $g(x) = \tan(x - 45°)$
   b. $h(x) = 4 - \tan(x)$

2. (**T3.6 - R**) (**CA**) Given ΔABC wherein side $b = 24$ cm, $\angle BAC = 47°$ and $\angle ABC = 83°$. **(Cirrito 9.5.1, p290)**

   a. Solve ΔABC.
   b. Find the altitude of ΔABC, using side a as the "base" of the triangle.

3. (**A1.2 - N**) (**CI**) Mr. S. would like to solve the equation $\log_2(x) + \log_{0.5}(x + 2) = -1$.

   a. Explain why he cannot start by using the addition rule of logarithms.
   b. Show that $\log_{0.5}(x + 2) = -\log_2(x + 2)$
   c. Hence or otherwise, solve the equation $\log_2(x) + \log_{0.5}(x + 2) = -1$.

4. (**F2.4, F2.7 - E**) (**CI**) Find the value(s) of $\boldsymbol{q}$ for which the quadratic equation $\boldsymbol{q}x^2 - 4\boldsymbol{q}x + 5 - \boldsymbol{q} = 0$ has no roots. **(Cirrito 2.4.2, p45)**

5. (**V4.3 - N**) (**CI**) I have been observing the motion of a bug that is crawling on my graph paper. When I started watching, it was at the point (1, 2). Ten seconds later it was at (3, 5). Another ten seconds later it was at (5, 8). After another ten seconds it was at (7, 11). **(Cirrito 12.7.2, p452)**

   a. Draw a picture that illustrates what is happening.
   b. Write a description of any pattern that you notice. What assumptions are you making?
   c. Where was the bug 25 seconds after I started watching it?
   d. Where was the bug 26 seconds after I started watching it?

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6. (**T3.5 - N**) (**CI**) Given the domain of $0° \leq x \leq 360°$, solve the following equations:

(Cirrito 10.4, p351 ….look for tan fcns examples)

   a. Solve $\sqrt{3}\tan(x) + 1 = 0$
   b. Solve $\tan^2(x) - \tan(x) = 0$

Section B (Extended Response/Investigation)

7. (**PS5.8 - N**) (**CA**) To continue introducing the concept of binomial probability distributions, answer the following questions that involve the following scenario: You are given 4 "unfair" coins, in which the probability of getting "HEADS" is only 40% (or $\frac{2}{5}$) and thus the probability of heads is 60% (or likewise $\frac{3}{5}$). Our "experiment" consists of tossing each of the 4 coins once and looking to see how many HEADS we have at the end of the "experiment". **(Cirrito 16.3.4, p544)**

   a. Use a tree diagram to show ALL possible outcomes of this experiment.

   b. How many different ways can you get 2 heads?

   c. Determine how probable it is that we get:
      i. One head
      ii. Two heads
      iii. Three heads
      iv. Four heads

   d. Draw a probability histogram, where the x-axis is the number of heads and the y-axis is the probability of getting heads.

   e. Expand $(p + q)^4$.

   f. Now we will let p = probability of getting a HEAD (so $p = \frac{2}{5}$) and if we let q = probability of NOT getting a HEAD (so $q = \frac{3}{5}$). Use your expansion from part d to calculate the probability of getting two heads from our "experiment".

   g. Go online to find definitions for (i) binomial experiments and (ii) Bernoulli trials and (iii) binomial probability distributions

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8. (**PS5.8 - N**) (**CA**) In another binomial probability experiment involving unfair coins, 8 trials were run and the probability of getting HEADS was $\frac{2}{7}$. Determine the probability of getting:

(Cirrito 16.3.4, p544)

   a. Exactly 5 heads
   b. Less than 5 heads
   c. More than 5 heads
   d. At least one head