

# Math SL PROBLEM SET 28

## Section A (Short Answer)

- (F2.7 - E) (CI)** Given the function  $q(x) = 2x^2 - 3x + 2$ , determine: **(Cirrito 2.4.1, p41)**
  - The number of  $x$ -intercepts of  $q(x)$ .
  - The value of  $K$  in the linear function  $f(x) = -x + K$  such that the equation  $q(x) = f(x)$  has only one solution.
  - Interpret the meaning of the scenario in Q(b).
  
- (T3.2, T3.3 - E) (CI)** Given that  $\sin(\theta) = -\frac{5}{6}$ , where  $\frac{3\pi}{2} < \theta < 2\pi$ , evaluate **(Cirrito 10.1.2, p316)**
  - $\sin(2\theta)$
  - $\cos(2\theta)$
  - $\tan(2\theta)$
  - $\sin(4\theta)$
  
- (T3.5 - E) (CI)** Given  $2\tan^2(\theta) + \tan(\theta) - 1 = 0$  and given that  $\tan^{-1}(1/2) = 26.6^\circ$ , solve for  $\theta$  on the domain of  $-180^\circ < \theta < 360^\circ$ . **(Cirrito 10.4, p351 ....look for tan fcn examples)**
  
- (V4.3 - N) (CI)** Given the following information about points in 2 space or 3 space, determine the equation in vector form of the line ( $\mathbf{r} = \mathbf{a} + \lambda \mathbf{b}$ ) described below: **(Cirrito 12.7.1 p444)**
  - The line passes through A(2,5) and B(3,4)
  - The line passes through A(2,0,5) and B(3,4,8)
  - The line passes through (3,-4,7) and (7,5,-2)
  - The line passes through the point (2,6,-1) and is parallel to a second line which is by defined by the equation  $x = 2 - 3t, y = 1 + t, z = -1 + 2t$ .
  
- (A1.1, A1.2 - E) (CA)** A series is defined as  $\log_2(3) + \log_2(3)^2 + \log_2(3)^3 + \log_2(3)^4 + \dots$ . What is the smallest value of  $n$  such that  $S_n > 1000$ ? **(Cirrito 7.4, p221)**

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## Section B (Extended Response/Investigation)

6. **(SP5.8 - N) (CA)** Consider the following binomial expansion and binomial probability distribution question. **(Cirrito 16.3.4, p544)**

- Expand  $(a + b)^5$ .
- Hence, expand  $(0.4 + 0.6)^5$ .
- If the probability of tossing a head with a coin is 0.4, how probable is it that Mr S tosses 3 heads in 5 tosses of a coin?

$$P(x) = \binom{5}{x} (0.4)^x (0.6)^{5-x}, x = 0, 1, 2, \dots, 5$$

- For the following equation
    - Make a table for this distribution
    - Graph the distribution
    - Find the mean of this distribution
7. **(F2.2, F2.4, C6.1 - E) (CI & CA)** After being dropped from the top of a tall building, the height of an object is described by  $h(t) = 400 - 16t^2$ . **(Cirrito 18.1.3, p582)**
- (CI) Sketch a graph that shows the height on the vertical axis and the time on the horizontal axis. Label the  $h$ -intercept as A and  $t$ -intercept as B.
  - (CI) Draw the line segment AB and find its slope. What does the slope of AB tell you about the falling object?
  - (CA) Let C be the point where  $t = 2$  and let D be the point where  $t = 2.1$  and then draw the segment CD and determine its slope. What does the slope tell you about the falling object?
  - (CA) If the height of the object dropped were given by the equation  $H(t) = 450 - 16t^2$  instead of  $h(t) = 400 - 16t^2$ , would your answers to Q(b) and Q(c) change, if at all?
  - (CA) Show that the equation of the inverse of  $y = h(t)$  is  $t(h) = \sqrt{25 - \frac{1}{16}h}$  and explain why we might use this equation.

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8. (T3.6 - R) (CA) 3D triangle trig problem (Cirrito 9.3, p285)

A right pyramid with a rectangular base and a vertical height of 60 cm is shown in the diagram alongside.

The points  $X$  and  $Y$  are the midpoints of the sides  $[AB]$  and  $[BC]$  respectively

Find

- the length,  $AP$ .
- the length of the edge  $[AV]$ .
- the angle that the edge  $AV$  makes with the base  $ABCD$ .
- the length,  $YV$ .
- The angle that the plane  $BCV$  makes with the base.

