

Math SL PROBLEM SET 28

Section A (Short Answer)

1. **(F2.7 - E) (CI)** Given the function $q(x) = 2x^2 - 3x + 2$, determine: **(Cirrito 2.4.1, p41)**
 - a. The number of x -intercepts of $q(x)$.
 - b. The value of K in the linear function $f(x) = -x + K$ such that the equation $q(x) = f(x)$ has only one solution.
 - c. Interpret the meaning of the scenario in Q(b).

2. **(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)**
 - a. $\sin(2\theta)$
 - b. $\cos(2\theta)$
 - c. $\tan(2\theta)$
 - d. $\sin(4\theta)$

3. **(T3.5 - E) (CI)** Given $2\tan^2(\theta) + \tan(\theta) - 1 = 0$ and given that $\tan^{-1}(\frac{1}{2}) = 26.6^\circ$, solve for θ on the domain of $-180^\circ < \theta < 360^\circ$. **(Cirrito 10.4, p351 ...look for tan fcns examples)**

4. **(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)**
 - a. The line passes through A(2,5) and B(3,4)
 - b. The line passes through A(2,0,5) and B(3,4,8)
 - c. The line passes through (3,-4,7) and (7,5,-2)
 - d. The line passes through the point (2,6,-1) and is parallel to a second line which is defined by the equation $x = 2 - 3t$, $y = 1 + t$, $z = -1 + 2t$.

5. **(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

- (a) the length, AP .
- (b) the length of the edge [AV].
- (c) the angle that the edge AV makes with the base ABCD.
- (d) the length, YV .
- (e) The angle that the plane BCV makes with the base.

