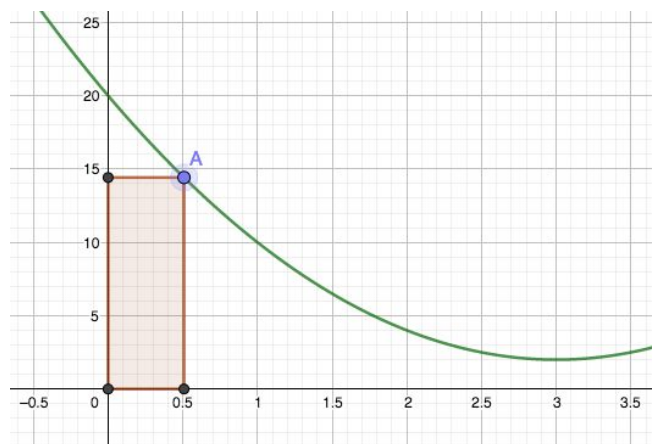


Math SL PROBLEM SET 84

Section A (Skills/Concepts Consolidation)

1. **(C6.3 - R) (CA)** The graph shows the parabola $y = 2(x - 3)^2 + 2$ as well as a rectangle drawn from between the x -axis and the curve at Point A; so between the points where $x = 0$ and $x = 0.5$.
- Determine the area of the current rectangle.
 - Point A is now free to move along the curve. Determine a value for x such that the area of the rectangle between $x = 0$ and $x = a$ is a maximum area, where $0 < a < 3$.



2. **(SP5.8 - R) (CA)** A bag contains 7 marbles, of which 2 are blue. A marble is selected, its colour noted, and then replaced in the urn. This process is carried out 21 times. Find:
- (Cirrito 16.3, p544)**
- The probability that you get 5 blue marbles.
 - The probability that you get at most 10 blue marbles.
 - The probability that you get at least 15 blue marbles.
 - Find the mean as well as the standard deviation of the number of blue marbles selected.
3. **(T3.6 - R) (CA)** Solve $\triangle ABC$ given that $a = 50$ cm, $b = 80$ cm and $\angle BAC = 35^\circ$.
- (Cirrito 9.5.2, p296)**
4. **(SP5.9 - R) (CA)** From 100 first year students writing the Biology exam, 46 of them passed while 9 were awarded “high distinction.”
- (Cirrito 17.2, p571)**
- Assuming that the student scores were normally distributed, find the mean and standard deviation if a pass mark was 40 and “high distinction” was 75.
 - Of those who failed, the top 50% were allowed to write a “make-up” exam. What is the lowest possible score that will allow a student to write this “make-up” exam?

Math SL PROBLEM SET 84

Section B (Skills/Concepts Practice)

5. **(V4.2 - R) (CI) SKILL:** Vector Equation of Lines. Write the equation of the line $2x + 3y = 7$ in vector form. (i.e. $\vec{r} = \vec{a} + t\vec{d}$)

6. **(V4.2 - R) (CI) SKILL:** Vector Equation of Lines. Determine if (and where) the following two

lines intersect: $\vec{r} = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} + \mu \begin{pmatrix} 1 \\ -1 \\ -3 \end{pmatrix}$ and $\vec{r} = \begin{pmatrix} 2 \\ 1 \\ 0 \end{pmatrix} + \mu \begin{pmatrix} 0 \\ 3 \\ 5 \end{pmatrix}$.

7. **(V4.2 - R) (CI) SKILL:** Vector Eqn of Line. Find two points on the line with Cartesian equation $x - 5 = \frac{y+4}{-4} = \frac{z-6}{3}$ which are a distance of 5 units from the origin.

8. **(T3.3) (CI) SKILL:** Trig Identities.

a. If $\sin(x) = -\frac{5}{8}$ and $270^\circ < x < 360^\circ$, find: (i) $\sin(2x)$ (ii) $\cos(2x)$

b. If $\cos(x) = \frac{1}{3}$ and $0^\circ < x < 90^\circ$, find: (i) $\sin(2x)$ (ii) $\cos^2(2x)$

9. **(C6.5 - R) (CI) SKILL:** Solving Equations. Given the function $g(x) = 2x - 1$;

a. Solve for a if: i. $\int_a^4 g(x)dx = 0$ ii. $\int_a^4 g(x)dx = 10$.

Section C (Skills/Concepts HW)

10. Oxford, Exercise 13B, p453, Q3
11. Oxford, Exercise 13E, p460, Q7
12. Oxford, Exercise 13I, p474, Q3,8