Math SL PROBLEM SET 62

Section A (Short Answer)

1. (**C6.2 - R**) (**CI**) The slope of the curve $y = x^2 - 4x + 6$ at the point (3,3) is equal to the slope of the curve $y = 8x - x^2$ at (a,b). Find the value of a and b. **(Cirrito 20.1, p643)**

2. (**C6.3 - R**) (**CI**) For the function $y = x^4 - 2x^3$; **(Cirrito 20.2, p649)**
   a. find all stationary points and inflection points of the function,
   b. classify the stationary points,
   c. state its end behaviours,
   d. sketch the function.

3. (**V4.1 - R**) (**CA**) Triangle TRI is defined as follows:

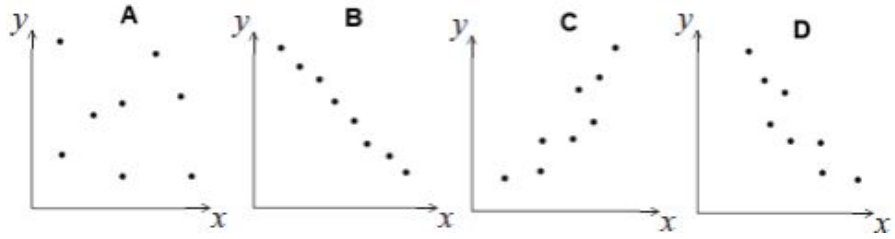
   $\overrightarrow{OT} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$; $\overrightarrow{TR} = \begin{pmatrix} 5 \\ 6 \end{pmatrix}$; $\overrightarrow{TR} \cdot \overrightarrow{IR} = 0$; $\overrightarrow{TI} = kj$

   where k is a scalar and j is a **unit vector in the y-direction**. **(Cirrito 12.3, p415)**

   a. Draw an accurate diagram of ΔTRI.
   b. Write the vector $\overrightarrow{IR}$.
   c. Find the measure of angle RIT.

4. (**SP5.4 - R**) (**CI**) A survey is conducted with eight marathon runners. For each runner, x is the number of marathons the runner has completed, and y is the runner's personal best time for the marathon distance. Let r be the correlation coefficient. **(Oxford 10.4, p349)**

   a. Write down the possible minimum and maximum values of r.
   b. Given that $r = -0.85$, which one of the diagrams below best represents the data?



   c. For the data in diagram C, which two of the following phrases describe the correlation between x and y:
   perfect, zero, linear, strong positive, strong negative, weak positive, weak negative

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5. (**C6.5 - N**) (**CI**) Evaluate the following definite integrals. Use your TI-84 to graphically verify your result and include a diagram. **(Cirrito 22.4, p740)**

   a. $\int_{-2}^{1} (3x^2 - 4x^3)\,dx$ b. $\int_{1}^{5} \frac{5}{t^2}\,dt$ c. $\int_{0}^{\pi} cos(\frac{1}{2}x)\,dx$ d. $\int_{1}^{3} \frac{a^5+2}{a^2}\,da$

6. (**C6.3 - N**) (**CA**) Use Symbolab to take the following derivatives. Comment on any patterns you observe: **(Cirrito 19.5.3, p638)**

   a. $f(x) = \frac{2x-3}{x+1}$ b. $g(x) = \frac{sin(x)}{x}$ c. $h(x) = \frac{e^{2x}}{x^2}$

Section B (Extended Response/Investigation)

7. (**C6.6 - E**) (**CA**) The displacement, s, of a particle moving along the x-axis relative to the origin, is given by the position function $s(t) = -t^2 + 6t$, where s is in centimeters and t is in seconds. **(Cirrito 20.3.1, p694)**

   a. Determine the particle's velocity function, $v(t)$.
   b. Graph both the position function and the velocity function on separate axis.
   c. Find the particle's position at the following times:
      i. $t = 0$, ii. $t = 1$, iii. $t = 3$ iv. $t = 6$ seconds.
   d. Find the particle's displacement for the following time intervals: (confirm on TI-84 using VT graph …. (how??)
      i. $0 \le t \le 1$, ii. $1 \le t \le 3$, iii. $3 \le t \le 6$ iv. $0 \le t \le 6$.
   e. Find the particles total distance travelled for the following time intervals:
      i. $0 \le t \le 1$, ii. $1 \le t \le 3$, iii. $3 \le t \le 6$ iv. $0 \le t \le 6$.

8. (**SP5.7 - E**) (**CA**) Here is a data set, showing the daily demand for AAPLE V2 computers and the associated probabilities for the specified daily demand: **(Cirrito 16.2, p535)**

x	0	1	2	3	4	5
$P(X = x)$	0.08	0.40	0.24	0.15	0.08	0.05

   a. Calculate the expected value of the daily demand using the formula $E(x) = \Sigma\, x \times P(x)$.
   b. Calculate the variance using the formula $var(x) = \Sigma\, (x - \mu)^2 \times P(x)$.
   c. Calculate the variance using the formula $var(x) = \Sigma\, x^2 \times P(x) - [E(x)]^2$
   d. Hence, calculate the standard deviation.
   e. Find the expected value and standard deviation using the LISTS and STATS CALC on your TI-84.