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17078

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Math Excercise

1. $[25.2 \quad -3 \quad -23]$

2. 2×4

3. 2×3

4. $u + v = (-0.5, 1.5)$

$v + w = (5.5, 2.5)$

$u + w = (2, 1)$

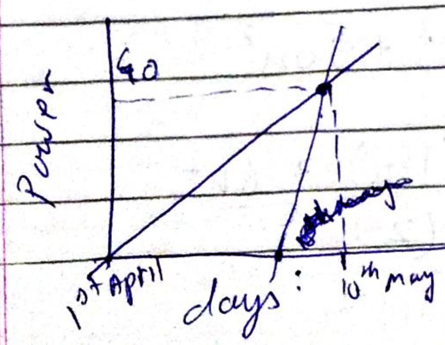
$u + v + w = (3.5, 2.5)$

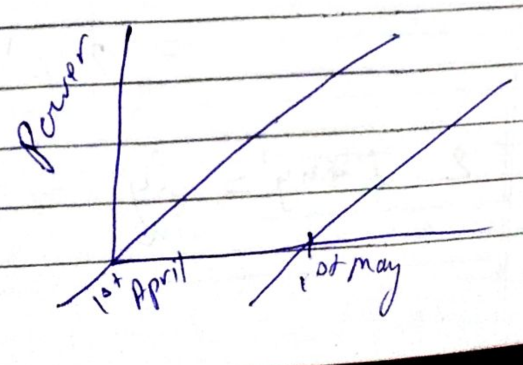
Jill problem

~~let y is the power generated by~~

1) 10^{th} May
2) Total Energy = 40kJ + 40kJ = 80 kJ

3) Mark II will never be able to generate power as much as Mark I





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Calculus - Problem

1. $\frac{dy}{dx} = -15x^2$

2. $\frac{dy}{dx} = 4x + 2$

3. $\frac{dy}{dx} = 50x^4 - 18x^2 - 1$

4. $\frac{dy}{dx} = 2x + 2$

$\left.\frac{dy}{dx}\right|_{x=1} = 4 + 2 = 6$

$\left.\frac{dy}{dx}\right|_{x=-1} = 2 \times (-1) + 2 = 0$

Calculus Problem

1. $f'(x) = \frac{dy}{dx} = (2x^3 + 5x^2)(4x+6) + (2x^2+6x)(6x^2+10x)$

$= 8x^4 + 20x^3 + 12x^3 + 30x^2$
$+ 12x^4 + 36x^3 + 20x^3 + 60x^2$

$= 20x^4 + 88x^3 + 90x^2$

2. $y' = \frac{dy}{dx} = \frac{(2-x)(18x) + 6x^2}{(2-x)^2}$

$$= \frac{36x - 18x^2 + 6x^2}{(2-x)^2}$$

$$= \frac{36x - 12x^2}{(2-x)^2}$$

3. $\frac{dy}{dx} = 2(3x+1) \times 3 = 6(3x+1)$

4. $y' = \frac{dy}{dx} = 6(x^2+5x)^5(2x+5)$

5. $f'(x) = \frac{df(x)}{dx} = -1((x^4+1)^5+7)^{-2} \times 5(x^4+1)^4 \times 4x^3$

$$= \frac{-20x^3(x^4+1)^4}{((x^4+1)^5+7)^2}$$

<u>Z-score</u>:- Z-score tells how many standard deviations away a data point is from the mean.

$$Z\text{score} = \frac{(x - \text{mean})}{\text{std. deviation}}$$

<u>Outliners</u>:- If ~~a~~ the z score of a point is more than 3, it indicates that the data point is quite different from the other data points. Such a data point can be an outliner.

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p-value: helps us determine how likely it it is to get a particular result when the null hypothesis is assumed to be true. It is the probability of getting a sample like ours or more extreme than our if the null hypothesis is correct. Therefore, if the null hypothesis is assumed to be true, the p-value gives us an estimate of how "strange" our sample is.

If the p-value is very small (<0.05), then our sample is strange, and this means that our assumption that that the null hypothesis is correct is most likely to be false. Thus we reject it.

Comparing Means with t-tests

The t-test is a common method for comparing the mean of one group to a value or the mean of one group to another. T-test are very useful because they usually perform well in the face of minor to moderate departure from normality of the underlying group distribution.

Suppose you have two independent Groups:

	Group 1	Group 2
mean	$\bar{X}_1$	$\bar{X}_2$
variance	S_1^2	S_2^2

$$t\text{-test} = T = \frac{|\bar{X}_1 - \bar{X}_2|}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Where n_1 : no. of sample in Group 1
n_2 : no. of samples in Group 2

Confidence Interval

A confidence interval is how much uncertainity there is with any particular statistic. Confidence intervals are often used with a margin of error. It tells you how confident you can be that the results from a poll or survey reflect you would enect to find if it were possible to survey the entire population.

If you have one small set of data, we will use the t-distribution instead of normal distribution.

$$C.I = \bar{X} \pm t\frac{s}{\sqrt{n}}$$

ANOVA test

An Anova test is a way to find out if survey or experiment results are significant. In the other words, they help you to figure

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out if you need to reject null hypothesis or accept the alternate hypothesis.

$$F = \frac{\text{Between group variation}}{\text{within group variation}}$$

Null hypothesis

It is a type of conjecture used in statistics that propose that there is no difference between certain characteristic of a population or data-generating process.

Alternative hypothesis

Alternative hypothesis is just an alternative to the null hypothesis.

Random Variable :- It is a variable whose value is unknown or a function that assign values to each of an experiments outcomes. ~~A random~~ variables is most ~~common in probability and~~

Discrete vs. Continuous Variable

If a variable can take on any value between two specified value it is called a continous variable otherwise, it is called discrete variable

Probability Mass Function

It is the function which describe the probability associated with the random variable x. P(X=x) corresponds to the probability that the random variable x take the value x

Probability Density function

Some variable are not discrete. They can take an infinite number of value in certain range. But we still need to describe probability associated with it. The equivalent of the probability mass function for continous variable is called probability density function

Expected value

The Expected value of a random variable X denoted E[X], is a generalization of the weighted average, and is intuitively the arithmetic mean of a large number of independent realization of X