



October 18, 2019

BSE Limited
P. J. Towers
Dalal Street, Fort
Mumbai - 400 001

National Stock Exchange of India Limited
Exchange Plaza
Bandra Kurla Complex
Bandra (E),
Mumbai – 400 051

Dear Sirs,

Sub.: Submission of copies of newspaper advertisements

In continuation of our letter dated October 17, 2019, we enclose copies of the advertisements published on October 18, 2019, in MINT (English) and HINDUSTAN (Hindi) with respect to notice of the Board Meeting scheduled to be held on October 25, 2019.

This is for information and record.

Thanking you,

Yours faithfully,
For Jubilant Life Sciences Limited

Rajiv Shah
Company Secretary

Encl.: as above

A Jubilant Bhartia Company

OUR VALUES



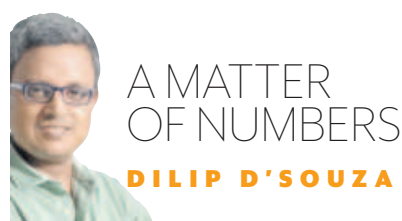
Jubilant Life Sciences Limited

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Noida-201 301, UP, India
Tel: +91 120 4361000
Fax: +91 120 4234895-96
www.jubl.com

Regd Office:
Bhartiagram, Gajraula
Distt. Amroha - 244 223,
UP, India
CIN : L24116UP1978PLC004624

The more things change, the more they're invariant

The search for an invariant gives us a different perspective on a problem we're faced with, and that new perspective often takes us closer to a solution



A MATTER OF NUMBERS
DILIP D'SOUZA

Respond to this column at feedback@livemint.com

Remember the Hummer shuffle, which made an appearance in this column a couple of years ago? ("The fixed point of it all", bit.ly/3huLmn). It's simply this: On a pack of cards, turn over the top two. If they were all face-down to start with, the Hummer shuffle turns the top two cards face-up.

As I wrote then: "Now cut the deck however you choose; do the Hummer shuffle again—in fact, do both moves as many times as you like, in any order. When you stop, you will have a deck that has some unpredictable number of face-up cards. But even if that's unpredictable, there is one feature of your card deck that has stayed invariant through all your shuffling and cutting: the number of face-up cards is even."

That small but significant truth is the basis for various intriguing card tricks. With a roomful of people a few days ago, I even tried a slight variation: I turned only the top card face-up before doing the Hummer shuffle on the pack. Now, through any number of cuts and further Hummers, the number of face-up cards stayed odd—and that was the basis for the trick I played on them. I have to confess, though, that it left them singularly unimpressed.

Still, there's a point here: About invariance. This is a principle that applies all the way from card tricks to logical puzzles and on into realms of mathematics and physics, and is of immense value every time. Given some objects, possibly mathematical, that we're interested in and an operation we want to subject them to, we look for some property of the objects that doesn't change

once we apply the operation. With the cards I mentioned above, the operations are the Hummer shuffle and the cut. Do them once, twice or a hundred times, and the properties I mentioned—the oddness or the evenness of the number of face-up cards—is invariant.

So, let me throw some other invariants at you, to give you a flavour of why the idea is useful.

* Hold a tennis ball in your hand and rotate it. You will agree that neither its surface area nor its volume changes: They are invariant under such rotation.

* Take any two numbers and consider the difference between them. For example, 871 and 47: The difference is 824. Add the same quantity to both numbers—say 131, to produce 1,002 and 178—and the difference between the two new numbers remains 824: That difference is invariant under such mutual addition. Trivial, you think? But the study of number theory begins with apparently trivial fundamentals like this.

* Draw a triangle on a sheet of paper. Now change the lengths of its three sides any which way, drawing a new triangle each time. Whatever triangle you come up

If one applies the two-out-one-in operation repeatedly to a bag of 100 marbles, the invariant will be the sum of all the numbers in the collection.

with, the sum of its angles is always 180° (degrees). That sum is invariant regardless of what triangle you draw. This is, of course, basic trigonometry.

* Fashion a teacup out of clay or plasticine. Now stretch and reshape it—but no tearing!—so it becomes doughnut-shaped. Both teacup and doughnut have one hole all the way through the clay, and no more: That one hole is invariant under any amount of stretching or reshaping you do to the clay. The study of properties that are invariant under this kind of reshaping is at the foundation of the entire mathematical field of topology.

Intriguingly, the invariant I mentioned about the angles of a triangle does not necessarily hold on three-dimensional surfa-

ces—like teacups or doughnuts or even planets. Consider, for example, the triangle formed on the surface of the Earth by the 0° and 90° meridians (lines of longitude) and the Equator. All three are straight lines. The two meridians meet at the North Pole, and of course each meets the Equator. All three angles are 90°, meaning the triangle's total is 270°. Not 180°, like you've always believed about triangles: That invariance is only for two-dimensional triangles.

The point, for someone like me who likes dipping into mathematics, is that invariance is about seeing things in different ways.

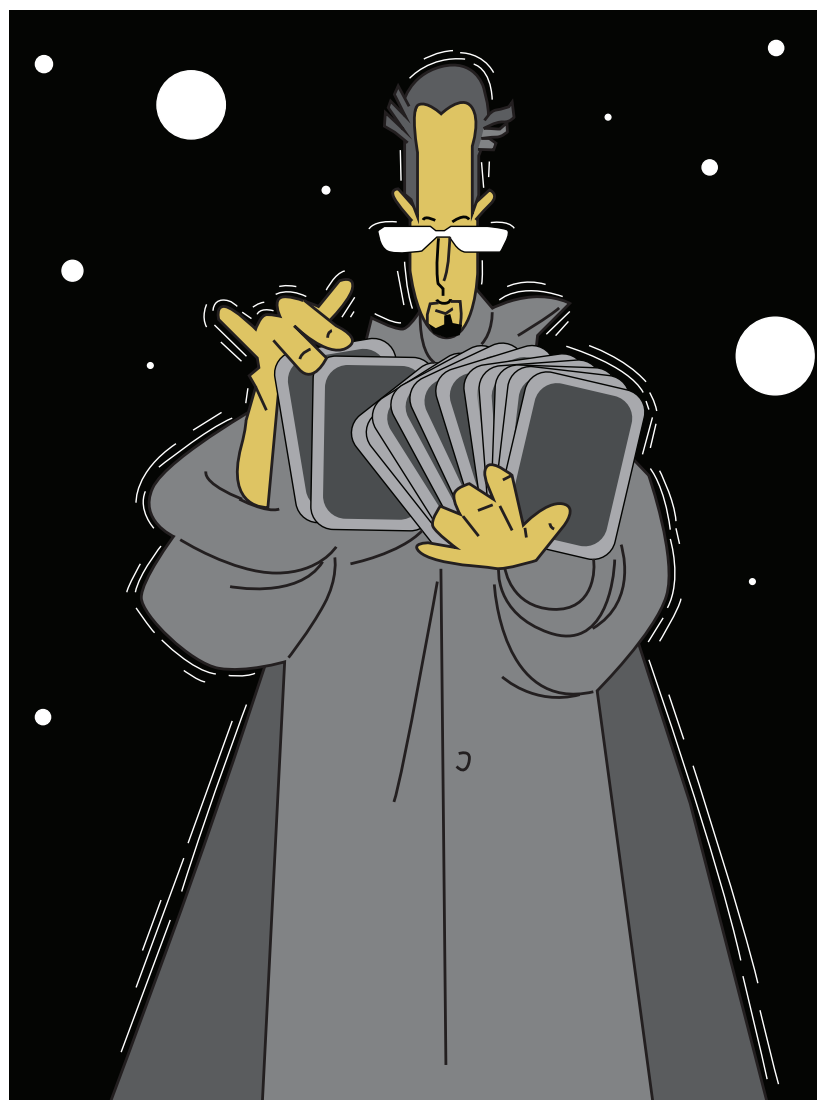
For example, give this puzzle a thought. I have a bag with 100 marbles, each with a random number on it. You remove two marbles at random, add their numbers, write that on a new marble, put it in the bag and throw away the two you took out. Now there are 99 marbles in the bag. Repeat until there's only one marble left in the bag. What's the number on it? (Stop reading here if you'd like a few minutes to think about this without hints.)

You might try solving this by writing down 100 numbers, then doing the two-out-one-in operation over and over... tedious at best. Then you might try it with just 10 numbers; probably still tedious.

But instead, you could ask: What about this set of numbers stays invariant

under this particular two-out-one-in operation? I suspect you'll get an answer to that if you work out what happens if I had only two numbers. But try it, nevertheless, with 100.

What can you do with 100 random numbers? Maybe you can add them all up. Hold on to that total. When you remove two, that figure in your mind decreases by their sum and the bag is down to 98 marbles. But then you put their sum back as a single number, going up to 99 marbles. Which means the total of the set of 99 is the same as the total of all 100. Aha! Are you on to something here? Do the operation again, and you realize the total of the resulting 98 numbers is the same as the total of 99, the same as the total of the original 100.



JAYACHANDRAN/MINT

Indeed you're on to something: The invariant here is the sum of all the numbers in the collection. And this means that when you're down to one marble, voilà, the number on it is the total of the original 100.

The search for an invariant gives us a different perspective on a problem we're faced with, and perspective often takes us closer to a solution. Put it another way: Invariance gives us a deeper understanding, and that's why it applies in so many areas of mathematics.

In physics, invariance is embedded in the conservation laws, like the conservation of momentum. Momentum is the product of an object's mass and its velocity. The law tells us that when two objects collide, the sum of their respective momentums stays the same. This will make immediate sense to you if you think of standing on a street and being hit by a speeding car. Slamming into you will slow the car down, certainly. It will also speed you up. You may even have time to calculate that the sum of

the car's momentum and yours before the collision remains the same after, given that the car has slowed and you are suddenly flying rapidly through the air. This applies in reverse, too. Imagine going out for a run, turning a blind corner and smacking hard into a stationary SUV. As you fall to the ground in agony, your momentum sinks to zero. But console yourself by remembering that you have in effect transferred all of your momentum to the SUV, thus moving it a tiny bit.

In either case, momentum is conserved. The sum of your momentum and the car's isn't changed by the collision. In other words, it's invariant.

Similarly with angular momentum, which applies to objects that rotate. It's defined as the momentum (as above) of the moving object, multiplied by the radius of the circle it traces as it rotates. The law explains why a figure skater doing a pirouette might start by stretching out her arms, then pull them in so she can whirl faster and faster. It explains why Venus travels faster on its path around the Sun than our Earth does, even though both planets are nearly the same size. Or why a spinning top stays upright. Or why, if you tie a stone to a string and whirl it around your head, it moves faster as you shorten the string.

In each case, again, angular momentum is conserved. Invariance, again.

Understanding such invariance about objects in motion helps us understand the working of our solar system, or the flight of an aircraft, or any number of other phenomena around us. It was crucial in planning the paths of Indian Space Research Organisation's Chandrayaan and Mangalyaan missions. (Regular readers of this column will remember I used the analogy of the whirling stone to explain their orbits). This is why invariance is so fundamental, so invariably fascinating.

Though I don't know if saying all this to the folks who were so indifferent to my card trick the other day would have changed anything. Invariantly unsmiling, all of them.

Once a computer scientist, Dilip D'Souza now lives in Mumbai and writes for his dimers. His Twitter handle is @DeathEndsFun

JUBILANT LIFE SCIENCES LIMITED
(CIN : L24116UP1978PLC004624)
Registered Office: Bhartiagram, Gajraula, District Amroha-244223, Uttar Pradesh
Phone: +91-5924-267200
E-mail: investors@jubl.com
Website: www.jubl.com

NOTICE

Pursuant to Regulation 47 of the Securities and Exchange Board of India (Listing Obligations and Disclosure Requirements) Regulations, 2015 (the "Listing Regulations"), NOTICE is hereby given that a meeting of the Board of Directors of the Company is scheduled to be held on Friday, October 25, 2019, inter-alia, to consider and approve the Unaudited Financial Results of the Company for the quarter and half year ended September 30, 2019 (the "Financial Results") in accordance with Regulation 33 of the Listing Regulations.

A copy of this Notice and the Financial Results shall also be available at the Company's website www.jubl.com and the websites of the Stock Exchanges - NSE: www.nseindia.com and BSE: www.bseindia.com.

For Jubilant Life Sciences Limited
Sd/-
Rajiv Shah
Company Secretary

Place: Noida
Date: October 17, 2019

JUBILANT INDUSTRIES LIMITED
(CIN: L24100UP2007PLC032909)
Registered Office: Bhartiagram, Gajraula, District Amroha-244 223, Uttar Pradesh
Ph.: +91-5924-267200
Email: investors@jubl.com
Website: www.jubilantindustries.com

NOTICE

Pursuant to Regulation 29 read with Regulation 47 of the Securities and Exchange Board of India (Listing Obligations and Disclosure Requirements) Regulations, 2015, NOTICE is hereby given that a meeting of the Board of Directors of the Company is scheduled to be held on Thursday, October 24, 2019, inter-alia, to consider and approve the Unaudited Standalone and Consolidated Financial Results of the Company for the quarter and half year ended September 30, 2019 (the "Financial Results").

A copy of this Notice and the Financial Results shall also be available at the Company's website www.jubilantindustries.com and the website of the Stock Exchanges - NSE: www.nseindia.com and BSE: www.bseindia.com.

For Jubilant Industries Limited
Abhishek Mishra
Company Secretary

Place : NOIDA
Dated : October 17, 2019

Noida Metro Rail Corporation Ltd.
Block-III, 3rd Floor, Ganga Shopping Complex, Sector-29
Noida-201301, Gautam Budh Nagar, U.P. Ph: 0120-4344483 / 84

1. E-Tender No. NMRC/Parking/91/2019 Tender for Licensing of Parking Rights at Selected Metro Stations in NMRC Network.

No: NMRC/Parking/91/2019 Dated: 18.10.2019

Tenders are invited from eligible bidders for the captioned projects. The Tenders shall be uploaded on website <https://etender.up.nic.in> and www.nmrcnoida.com on 18.10.2019. The Bidders can download the document from the E-Tender website from tender search by organization name: "Noida Metro Rail Corporation Limited". Amendment/Modification in tender, if any, will be uploaded on either/both the websites.

GM(Technical)

SOUTH DELHI MUNICIPAL CORPORATION

OFFICE OF THE EX. ENGINEER (M-I) WEST ZONE
Opp. Madhav Park, Rajouri Garden, New Delhi-110027
NIT No. E.E.(M-I)WZ/2019-20/TC/15 Dated : 16.10.2019

NOTICE INVITING TENDER

The Executive Engineer (M-I) West Zone, S.D.M.C., invites on behalf of the Commissioner, South Delhi Municipal Corporation, sealed percentage rates tender from the approved and eligible contractors registered with the MCD (General Wing) online on portal <http://www.tenderwizard.com/SOUTHDMCETENDER>

S. No.: 1, Estimate Amt.: Rs.26,02,900/-, Tender Amt.: Rs.24,07,234/-, Earnest Money: Rs.52,100/-, Time of Comp: 2 Month, Validity: 5 Month, Tender Cost: Rs.500/-, H/A: XL-VIII-S

S. No.: 2, Estimate Amt.: Rs.46,32,900/-, Tender Amt.: Rs.42,84,565/-, Earnest Money: Rs.92,700/-, Time of Comp: 3 Month, Validity: 5 Month, Tender Cost: Rs.500/-, H/A: XL-VIII-S

S. No.: 3, Estimate Amt.: Rs.97,57,100/-, Tender Amt.: Rs.88,94,789/-, Earnest Money: Rs.1,95,100/-, Time of Comp: 4 Month, Validity: 5 Month, Tender Cost: Rs.1000/-, H/A: XL-VIII-S

S. No.: 4, Estimate Amt.: Rs.53,32,100/-, Tender Amt.: Rs.48,60,824/-, Earnest Money: Rs.1,06,600/-, Time of Comp: 4 Month, Validity: 5 Month, Tender Cost: Rs.1000/-, H/A: XL-VIII-S

S. No.: 5, Estimate Amt.: Rs.1,18,59,800/-, Tender Amt.: Rs.1,09,54,152/-, Earnest Money: Rs.2,37,200/-, Time of Comp: 4 Month, Validity: 5 Month, Tender Cost: Rs.1000/-, H/A: XL-VIII-S

S. No.: 6, Estimate Amt.: Rs.59,99,900/-, Tender Amt.: Rs.55,48,756/-, Earnest Money: Rs.1,20,000/-, Time of Comp: 4 Month, Validity: 5 Month, Tender Cost: Rs.1000/-, H/A: XL-VIII-S

Bidding documents with name of work & detailed terms and conditions can be downloaded, from the website-<http://www.tenderwizard.com/SOUTHDMCETENDER> Start Date of Sale of Tender Documents: 21.10.2019 from 6:00PM, Last Date of Bid Submission: 01.11.2019 up to 1:00 PM, Opening of Financial Bid: 01.11.2019 at 3:30 PM. All detail of Revisions, Clarifications, Corrigendum, and Addendum, Time Extension etc. if any, in respect of above tender (s) will be uploaded on SDMC website <http://www.tenderwizard.com/SOUTHDMCETENDER> only and will not be published in newspaper(s) separately. Bidders should regularly visit the website to keep themselves regularly updated in respect of the tenders (s).

-Sd/-
Ex. Engineer (M-I)
West zone

R.O. No. 79/DPI/S/2019-20

New Okhla Industrial Development Authority
Main Administrative Complex, Sector-6, Noida, (UP)
Website : www.noidaauthorityonline.com

CORRIGENDUM LETTER

Due to unavoidable circumstances the date of uploading tender Job No.- 15/Noida/GM(C)/SM(WC-8)/E-Tender/2018-19 extended as per below:-

- Last date of Upload E-Bid : Dt. 24.10.2019
Date of Opening Pre-Qualification : Dt. 25.10.2019
- Scanned copy of Bank Guarantee/FDR shall be uploaded with tender documents and original Bank Guarantee/FDR should be submitted on 31.10.2019 at Office of Senior Manager, Work Circle-8, Noida Authority, Sector-19, Noida.
- Rest terms & Conditions shall remain same.

Interested Bidders are requested to please see E-Tender website www.etender.up.nic.in for other information.

General Manager, Noida

CLEAN, GREEN, SAFE & SECURE NOIDA

GAIL (India) Limited
(A Govt. of India Undertaking)
India's Youngest Maharatna

NOTIFICATION REGARDING TENDERS OF GAIL

The Notice Inviting Tender (NIT) the tender requirements of GAIL are being published only on GAIL Tender website (<http://www.gailtenders.in>) & E-tender website (<https://etender.gail.co.in>) and Government's Central Public Procurement Portal (<http://eprocure.gov.in>) and Government E-Marketplace (GeM) portal.

Further, details of benefits provided to MSEs bidders, MSEs owned by SC/ST entrepreneurs and MSEs owned by Women entrepreneurs, as per Public Procurement Policy for MSEs 2012 & its amendment, payment through TReDS, Consortia and Tender Marketing Scheme of NSIC, etc., are being mentioned in GAIL's tenders.

All interested bidders are requested to refer above websites for tenders of GAIL.

Registered Office: 16, Bhikaji Cama Place, R.K. Puram, New Delhi - 110066
[CIN: L40200DL1984G01018976]
Phone: 011-26182955, Fax: 011-26185941

Safety First Think Digital, Be Digital

New Okhla Industrial Development Authority
Administrative Building, Sector-6, Noida G.B Nagar, (U.P.)
Website: www.noidaauthorityonline.com

E-TENDER NOTICE

E-Tenders are invited from firms/contractors registered with UPLC Lucknow for the following jobs against which bids can be uploaded and same shall be opened / downloaded as per schedule mentioned. The details and conditions of all tenders are available on Noida Authority's official website : www.noidaauthorityonline.com & <https://etender.up.nic.in>. Please ensure to see these websites for any changes / amendments & corrigendum etc.

S. no.	Job no. / Work name	Amount
1.	81 / D (H) / DD (H)-I / 2019-20, D/o RSP (Theme painting on sector-18 underpass pillar and metro pillars) Noida.	Cost Rs. 72.16 Lacs

Which can be uploaded by date 31/10/2019 upto 5.00 PM. Pre-qualification shall be opened / downloaded on date 01/11/2019 at 11.00 AM.

Office : Sector 39, Noida Director (Hort.), Noida

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Business of Life

Daily articles on the workplace, and how it is evolving.

What CEOs are doing to improve gender equality at work

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