IB Math SL Notes **Inverse Normal Distribution**

Topic 6, Part 2 – Day 8

1. **Inverse of Standard Normal Deviation**

This is essentially working backwards. You can find z when given P(Z < z) = k for a given value of k.

You can use the tables, or in the GDC, 2nd VARS 3: invNorm(k)

**Example:** find the value of z such that P(Z < z) = 0.7019, so we are finding the value for z for which the area under the standardized normal curve is 0.7019.

**Examples (using GDC):** Find the value of z such that

1. P(Z < z) = 0.7 b) P(Z > z) = 0.637 c) P(|Z| < z) = 0.637

We can also use a similar process to find the value of x such that P(X < x) = k by entering:

invNorm(k, μ, σ)

Ex: Find the value k such that P(x ≤ k) = 0.95 given that x is normally distributed with mean 70 and standard deviation 10.

Ex 2: X is a normal random variable whose mean is 34.2. It is found that 75% of X are less than 35.7. Find the standard deviation of X.

1. **Applications of Normal Distribution and its Inverse:**
2. In 1972, the heights of Rugby players was found to be normally distributed with mean 179cm and standard deviation of 7 cm. Find the probability that in 1972 a randomly selected player was:
3. At least 175 cm tall
4. Between 170 cm and 190 cm
5. A university professor determines that 80% of this year’s History candidates should pass the final examination. The examination results are expected to be normally distributed with mean 62 and standard deviation 13. Find the lowest score necessary to pass the examination.
6. The masses of potatoes from a consignment of potatoes are normally distributed with mean 237g and standard deviation of 31g. Potatoes whose mass is greater than 300g are used for making French fries. If 1000 potatoes are randomly selected, estimate the number of potatoes which could be used for making French fries.
7. Find the mean and the standard deviation of a normally distributed random variable X if

P(x ≥ 50) = 0.2 and P(x ≤ 20) = 0.3

1. The lifetime of Superglow light bulbs is normally distributed. It is found that 12% fail within 2000 hours and 5% continue to operate after 2500 hours. Find the mean and the standard deviation of the lifetime of Superglow light bulbs.
2. Max’s customers put money for charity in a collection box on the front counter of his shop. The average weekly collection is approximately normally distributed with a mean of $40 and a standard deviation of $6. What proportion of weeks would he expect to collect
3. Between $30 and $50 b) at least $50
4. A student scored 70 for a science exam and 66 for a Geography exam. If the class scores are normally distributed with a mean and a standard deviation for science of 60 and 10 and for Geography 50 and 12,
5. in which subject did the student achieve a higher standard, and what percentage?
6. What percentage of others achieved lower marks in each subject?

IB Math SL Unit 5 – Day 8 HW Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_









