More Mathematics in Python

Built-In Functions/Constants

1. Calculate the absolute value of 7, and -7.
2. Determine the minimum value from the list: 4 -2 7 0 -1.
3. Determine the maximum value from the list: 18 3 -1 21 17.
4. Round π to 5 decimal places.
5. Round e to the nearest hundredth.

Math Module

6. Calculate the square root of 20.
7. Calculate the distance, d, between the the points (7,5) and (3,-1), using the formula $d=\sqrt{(y_2-y_1)^2+(x_2-x_1)^2}$.
8. Calculate sin(2), where 2 is in radians.
9. Convert 60° to radians.
10. Show that cos(60°) is ½. Is the answer what you expected? Explain.
11. It is well known that $\sin^{-1}(1)=90°$, but the command math.asin(1) produces a value of 1.57. Why? Modify the command to produce a value of 90°.
12. In the non-right triangle ABC, $b=3$, $c=5$ and $A=35°$. Determine the length of side a using the formula $a=\sqrt{b^2+c^2-2bc\cdot\cos A}$.
13. In the non-right triangle PQR, $p=6$, $r=4$ and $P=70°$. Determine the measure of angle R using the formula $R=\sin^{-1}\left(\dfrac{r\sin P}{p}\right)$.
14. Determine $\log_{10}(1\,000\,000)$.
15. Determine $\log_2(512)$.
16. Calculate the value of 9!
17. Determine the number of digits in the value of 20!
18. The number of ways to arrange n distinct objects in a line is given by $n!$. How many ways are there to arrange 12 distinct objects?
19. Determine $\lfloor 5.8 \rfloor$ and $\lfloor -5.8 \rfloor$.
20. Determine $\lceil 5.8 \rceil$ and $\lceil -5.8 \rceil$.
21. The number of *derangements* – ways in which n letters can be arranged, such that *none* of them appear in their alphabetical position – is given by $d=\left\lfloor\dfrac{n!}{e}+\dfrac{1}{2}\right\rfloor$. For example, there is one derangement of the letters A and B (B A) and two derangements of A B C (B C A and C A B). Use the formula to verify that the number of derangements for 1, 2, 3, 4 and 5 letters are 0, 1, 2, 9 and 44 respectively.