1. Log in to your Sage Cloud account.
   (a) Start the Chrome browser.
   (b) Go to \texttt{http://cloud.sagemath.com} and sign in.
   (c) You should see an existing Project for our class. Click on that.
   (d) Click “New”, call it \texttt{h02}, then click “Sage Worksheet”.

2. Find $635 \cdot 629$.

3. What command would you write to test whether a number $x$ equals 0?

4. What command would you write to find the remainder of dividing an integer $x$ by 2?

5. Find a 10-digit approximation for $\pi$.

6. Find a 10-digit approximation for $\sqrt{47}$.

7. What command would you write to find $\log_{10} 47$?

8. Sketch $x^3 - x$ on the interval $(-3, 3)$.

9. What command would you write to plot $x^2$ and $x^3$ on the interval $(-2, 2)$, using different colors?

10. What command would you write to plot $\sin(x)$ and $\cos(x)$ on $(-2\pi, 2\pi)$ on the same axes. Make them purple and green.

11. What command would you write to solve $x^2 - x = 25$.

12. What command would you write to solve the system: \[
\begin{align*}
2x + y &= 5 \\
x + 3y &= 7
\end{align*}
\]

13. Find the root of $f(x) = x^5 + x^4 + x^3 - x^2 + x - 1$ that’s in the interval $(-1,1)$.

14. What command would you write to make a triangle with a red dotted line.

15. What command would you write to find the first and second derivatives for $f(x) = x^x$. Solve $f'(x) = 0$.

16. Find a numerical approximation for $\int_2^3 t^{20}e^t \, dt$.

17. What command would you write to find $\lim_{x \to 0} \frac{\sin x}{x}$.

18. What command would you write to find the row-reduced echelon form of the matrix $A = \begin{bmatrix} 2 & 1 & 5 \\ 1 & 3 & 7 \end{bmatrix}$. 
19. What command gives you the entry of matrix \(A\) in the 2nd row and 3rd column?

20. What command would you write to define a list \(L\) of integers from 2 to 55.

21. What command would you write to define a list \(L2\) which contains the integers from 2 to 55 followed by the integers from 100 to 123.

22. What command would you write to define a list \(L3\) which contains 50 zeros.

23. What command would you write to use the `map` function to find the sine of the integers from 1 to 10.

24. Define an *anonymous function* (that is, using a `lambda` construction) `product` which returns the product of 2 numbers (so `product(x,y)=x*y`).

25. Define a function `square_list(L)` which inputs a list \(L\) of numbers and returns a list of the squares of those numbers.

26. Define a function `three_mult(n)` which tests if an integer \(n\) is a multiple of three, returns True if it is and False if it is not.

27. Define a function `list_evens(n)` that returns a list of all the even numbers up to \(n\).

28. Define a function `count_evens(L)` that inputs a list \(L\) of integers and counts how many of them are even.

29. Define a function `print_numbers(n)` that prints , “2 is a prime”, “3 is a prime”, for each prime less than \(n\). Use a `while` statement.

30. What is a recursive function?

31. Define a recursive function `test_rec(n)`
   with `test_rec(1)=5` and `test_rec(n)=test_rec(n-1)+17` if \(n>1\). Find `test_rec(10)`.

32. Define a function `collatz(x)` that returns \(x\) if \(x\) is one, returns `collatz(3x+1)` if \(x\) is odd, and returns `collatz(x/2)` if \(x\) is even.

33. The Fibonacci sequence \(F_n\) is defined as follows \(F_0 = 0\), \(F_1 = 1\) and \(F_n = F_{n-1} + F_{n-2}\) for \(n > 1\). Define an iterative (non-recursive) function `fib(n)` that computes \(F_n\) for a given input integer \(n\).

34. What command would you write to use `plot_step_function()` to sketch the graph of the Fibonacci numbers.

35. Given a continuous function \(f(x)\), and numbers \(a\), \(b\) and \(c\), define a function `test_average(f,a,b,c)` that returns the tuple \((a, (a + b)/2)\) if \(f((a + b)/2) \geq c\) and returns \(((a + b)/2, b)\) if \(f((a + b)/2) < c\).

36. Define a function `rightpoint_riemann(f,a,b,n)` which computes the rightpoint Riemann sums for \(n\) equal intervals.

37. If \(L\) is a list of integers, what command would you give to get a scatter plot that visualizes this data? What you write should work for any list \(L\), but test it with \(L=[2,3,5,7,11]\).

38. Define a function `randlist(n)` which returns a list of \(n\) random numbers in \([0,1]\) sorted from smallest to largest.