Math 121 - Calculus 1: Introductory Survey
(Developed by Professor Rose Morris-Wright)

Bring your best attempt (written on a separate page) at the following problems to class with you on Tuesday. These problems cover material that is assumed as background for our course. Feel free to pause and look up any facts that you may have forgotten.

Mark each problem as Green, Yellow, or Red using the following key: Green means you could do this problem confidently. Yellow means you need some time to review this topic. Red means that you have never seen this type of problem before.

1. Evaluate $16^{-\frac{3}{4}}$. Do not use a calculator.

2. Rewrite $\frac{x^4}{\sqrt[3]{x^2}}$ as an expression of the form x^k where k is a real number.

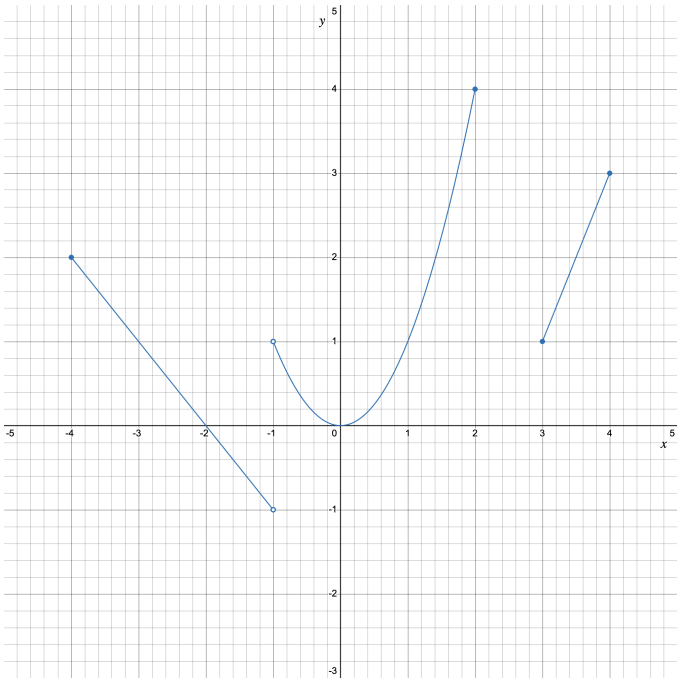
3. Rewrite the following expression in the form of a single rational expression, $\frac{\text{numerator}}{\text{denominator}}$.
$$\frac{1}{4x+8} - \frac{x-7}{(x+2)(x+3)}$$

4. Find the solutions (if any) to each of the following equaitons.
   (a) $x^2 + 1 = 0$
   (b) $x^2 - 2x - 3 = 0$
   (c) $x^3 = 9x$
   (d) $\dfrac{1}{x^2 - 5x - 14} = 0$

5. Find an equation for the line that passes through the point $(2, -1)$ and is parallel to the line $y = -2x + 6$.

6. Find the domain of the following function. Write your answer in interval notation.
$$f(x) = \frac{\sqrt{x-3}}{x^2 - 25}$$

7. Let $f(x)$ be the function graphed below:



(a) Find the domain of $f(x)$.

(b) Find $f(3)$.

(c) For what values, if any, is $f(x) = 1$?

(d) Find $(f \circ f)(2)$.

(e) On what intervals is $f(x)$ increasing?

(f) On what intervals is $f(x)$ positive?

8. Evaulate the following without using a calculator. All angles are in radians.

(a) $\sin(0)$

(b) $\cos(0)$

(c) $\sin(\frac{3\pi}{2})$

(d) $\tan(\frac{\pi}{4})$

9. Evaluate the following without a calculator. Note that ln represents the logarithm with base e where e is an irrational number approximately equal to 2.718.

   (a) $\log_2(8)$

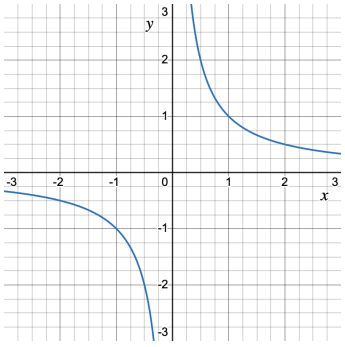
   (b) $\ln(e^3)$

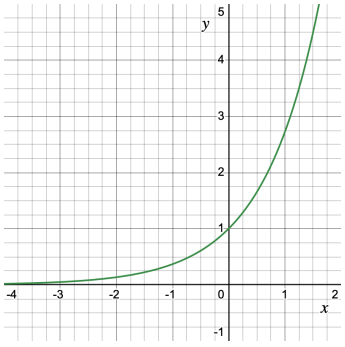
   (c) $\ln(1)$

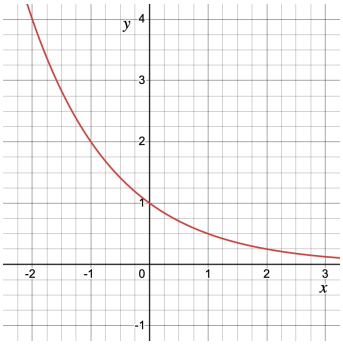
   (d) $2^{\log_2(11)}$

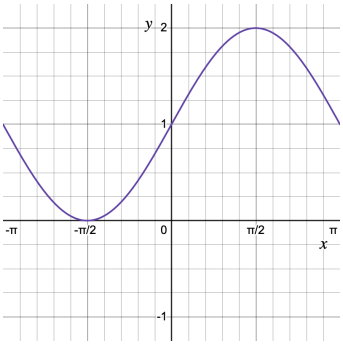
10. Match each of the following functions with one of the following graphs. Do not use a calculator.

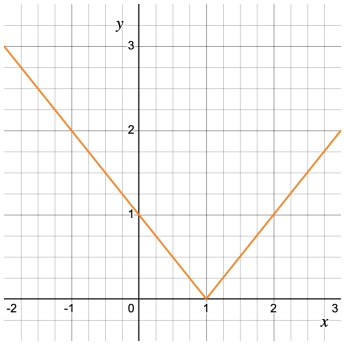
$$f_1(x) = \sin(x) + 1 \qquad f_2(x) = e^x \qquad f_3(x) = \frac{1}{x} \qquad f_4(x) = 2^{-x} \qquad f_5(x) = |x - 1|$$











11. Consider the following exercise and solution. Find all the errors in the solution.

Exercise: Let $f(x) = x^2 + 1$. Find $\dfrac{f(x+a) - f(x)}{a}$ and simplify as much as possible. Your final answer will contain a.

Solution: First, to compute $f(x+a)$, plug $x+a$ into the function $f(x) = x^2 + 1$ to get

$$f(x+a) = (x+a)^2 + 1.$$

Then, plug this into the expression to be simplified.

$$\begin{aligned}
\frac{f(x+a) - f(x)}{a} &= \frac{(x+a)^2 + 1 - x^2 + 1}{a} \\
&= \frac{x^2 + a^2 + 1 - x^2 + 1}{a} \\
&= \frac{a^2 + 2}{a} \\
&= a + 2.
\end{aligned}$$

If you marked more than 3 problems Red, you may not have the prerequisite knowledge required for this class. If this applies to you, please contact me so that we can talk more and discuss options.