Problem Set #2

Due Friday, September 13, 2024 @ 12:30 pm
Submit as single pdf file to Canvas

Remember that you need to explain and show the steps in your answers!

1. Use the unit circle to find the following values.
   Give your answers as exact values, like $\frac{1}{\sqrt{2}}$, rather than decimal approximations like 0.7071.

   (a) $\sin\left(\frac{\pi}{6}\right)$

   (b) $\cos\left(-\frac{\pi}{6}\right)$

   (c) $\sin\left(\frac{5\pi}{3}\right)$

   (d) $\tan\left(\frac{4\pi}{3}\right)$

2. Use the graph of $y = f(x)$ to find the following values.

   (a) $\lim_{x\to 2} f(x)$

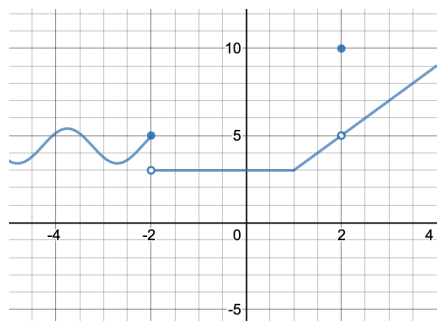
   (b) $f(2)$

   (c) $\lim_{x\to -2^-} f(x)$

   (d) $\lim_{x\to -2^+} f(x)$

   (e) $\lim_{x\to -2} f(x)$

   (f) $f(-2)$



Graph of $y = f(x)$

3. Evaluate $\lim_{x\to 5} \frac{x^2 + x - 30}{x^2 - 6x + 5}$ analytically. That is, do not just look at the graph to justify your answer.

4. Let $f(x) = x^3 - x^2 - 2x + 1$

   (a) Evaluate $\lim_{h\to 0} \frac{f(2+h) - f(2)}{h}$

   (b) Let m denote your answer from part (a). Find the equation of the line through the point $(2, f(2))$ with slope m.
   Recall that the point-slope equation for the line through a point (x_0, y_0) with slope m is $y - y_0 = m(x - x_0)$.

   (c) Graph $y = f(x)$ and your line from part (b) on the same set of axes. How are the graphs related?