Math 140 Worksheet 1

Week 1 (through Wednesday): Functions Review (Polynomial/Rational & Trigonometric)

Instructions. Write clear solutions on your own paper. Show enough work to justify your answers. Upload a single PDF of your work to Canvas.

1. **(Function evaluation)** Let $f(x) = 3x^2 - 5x + 1$.

   (a) Compute $f(2)$ and $f(-1)$.

   (b) Expand and simplify $f(a + h)$.

2. **(Composition and domain)** Let $g(x) = \sqrt{x + 2}$ and $h(x) = \dfrac{1}{x - 1}$.

   (a) Find $(g \circ h)(x)$ and state its domain.

   (b) Find $(h \circ g)(x)$ and state its domain.

3. **(Trig values)** Evaluate exactly (no decimals):
$$\sin\left(\frac{\pi}{6}\right), \quad \tan\left(\frac{\pi}{4}\right), \quad \cos\left(\arctan(3/4)\right).$$

4. **(Trig identity)** Verify the identity (where both sides are defined):
$$\frac{1 - \cos(x)}{\sin(x)} = \frac{\sin(x)}{1 + \cos(x)}$$

   (Algebraic manipulation is enough; no need for a diagram.)