

Math 140 Worksheet 1 — Solution Key
Week 1 (through Wednesday)

1. (a) $f(2) = 3(2)^2 - 5(2) + 1 = 12 - 10 + 1 = 3$.
 $f(-1) = 3(-1)^2 - 5(-1) + 1 = 3 + 5 + 1 = 9$.
(b) $f(a+h) = 3(a+h)^2 - 5(a+h) + 1 = 3(a^2 + 2ah + h^2) - 5a - 5h + 1$
 $= 3a^2 + 6ah + 3h^2 - 5a - 5h + 1$.
2. (a) $(g \circ h)(x) = g\left(\frac{1}{x-1}\right) = \sqrt{\frac{1}{x-1} + 2} = \sqrt{\frac{2x-1}{x-1}}$.
Domain: need $x \neq 1$ and $\frac{2x-1}{x-1} \geq 0$. Important points: $x = \frac{1}{2}$ (zero) and $x = 1$ (undefined). Sign chart gives domain $(-\infty, \frac{1}{2}] \cup (1, \infty)$.
(b) $(h \circ g)(x) = h(\sqrt{x+2}) = \frac{1}{\sqrt{x+2} - 1}$.
Domain: need $x+2 \geq 0$ (so $x \geq -2$) and $\sqrt{x+2} \neq 1$ (so $x \neq -1$). Thus domain $[-2, \infty) \setminus \{-1\}$.
3.
$$\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}, \quad \tan\left(\frac{\pi}{4}\right) = 1, \quad \cos(\arctan(3/4)) = \frac{4}{5}$$
4. Use the Pythagorean Identity.