

Quiz 2

Key

Show *all* your work. No credit is given without reasonable supporting work. There are *two* sides to this quiz.

1. [2] (LineSheet #12) Find a line that is parallel to $\frac{4}{7}x + \pi$ and passes through the point $(-1, 3)$.

// to $\frac{4}{7}x + \pi \Rightarrow$ same slope of $\frac{4}{7}$ (+1)

$y = mx + b$
 $y = \frac{4}{7}x + b$
 guess thru $(-1, 3)$ (+1.5) so
 $3 = \frac{4}{7}(-1) + b \Rightarrow b = \frac{4}{7} + 3$
 $\Rightarrow b = \frac{25}{7}$ (+1.5)

or $y - y_1 = m(x - x_1)$
 $y - 3 = \frac{4}{7}(x - (-1))$ (+1)

So $y = (\frac{4}{7})x + \frac{25}{7}$

2. [3] (WebHW3 #20) Let $f(x) = \frac{1}{\sqrt{x+2}}$ and $g(x) = x^2 - x$.

- (a) Find $(f - g)(2)$.

$(f - g)(2) = f(2) - g(2) = \left(\frac{1}{\sqrt{2+2}}\right) - (2^2 - 2) = \frac{1}{\sqrt{4}} - (4 - 2) = \frac{1}{2} - 2 = -\frac{3}{2}$ or -1.5

sgn/dlg (+1.5)

- (b) Find $(g \circ f)(-1)$

$(g \circ f)(-1) = g(f(-1)) = g\left(\frac{1}{\sqrt{-1+2}}\right) = g\left(\frac{1}{\sqrt{1}}\right) = g(1) = 1^2 - 1 = 0$

1st comp (+1.5) 2nd comp (+1.5)

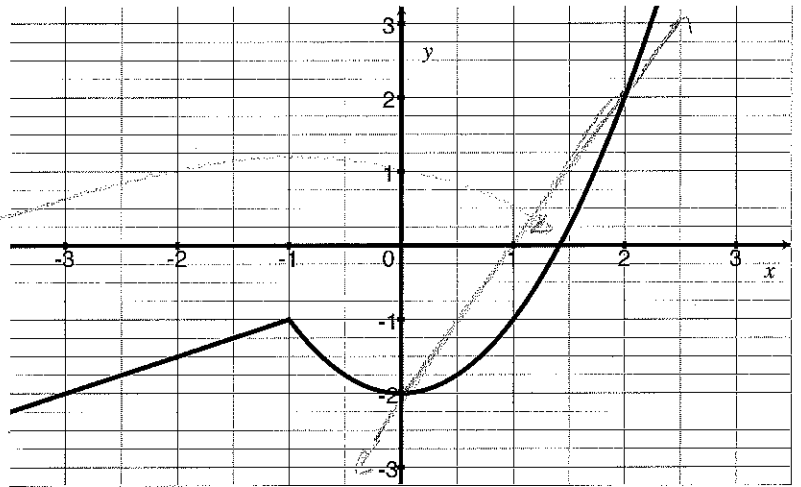
or

$-1 \xrightarrow{f} \frac{1}{\sqrt{-1+2}} = \frac{1}{\sqrt{1}} = 1 \xrightarrow{g} 1^2 - 1 = 0$

3. Let g be the piecewise defined graph shown below.

- (a) [1] (graphTransformation #5)
Estimate value(s) of x
so that $g(x) = 0$?

is x-intercepts
 ≈ 1.4



- (b) [3] (§1.2#68 & WebHW3#14)
Given that g is comprised
of a parabola and a line,
find the piece-wise defined
algebraic rule of g in the
form below.

$$g(x) = \begin{cases} \left(\frac{1}{2}\right)x - \frac{1}{2} & \text{if } x < -1 \\ x^2 - 2 & \text{if } -1 < x \end{cases}$$

line goes thru $(-3, -2)$ and $(-1, -1)$
slope = $\frac{-2 - (-1)}{-3 - (-1)} = \frac{-1}{-2} = \frac{1}{2}$

$y - (-1) = \frac{1}{2}(x - (-1))$
 $\Rightarrow y = \frac{1}{2}x + \frac{1}{2} - 1 \Rightarrow y = \left(\frac{1}{2}\right)x - \frac{1}{2}$

parabola shifted down 2 units
 $\Rightarrow x^2 - 2 = y$

or
 $y = a(x-h)^2 + k$
vertex @ $(0, -2) \Rightarrow h=0$ and $k=-2$
 $\Rightarrow y = a(x-0)^2 - 2$
thru $(1, -1) \Rightarrow -1 = a(1)^2 - 2$
 $\Rightarrow -1 = a - 2 \Rightarrow a = 1$

So $y = 1(x-0)^2 - 2$

- (c) [1] (WebHW2#16) Find the average rate of change of g as x changes from 0 to 2.

is the slope between

$(0, g(0))$ and $(2, g(2))$

$$\begin{aligned} \frac{\text{rise}}{\text{run}} &= \frac{g(2) - g(0)}{2 - 0} = \frac{2 - (-2)}{2} \\ &= \frac{4}{2} = 2 \end{aligned}$$