MAT1500-04/06 04F Quiz 1 Print Name (Last, First) ____________________

Show all work, including mental steps, in a clearly organized way that speaks for itself. Use proper mathematical notation, identifying expressions by their proper symbols (introducing them if necessary), and use arrows and equal signs when appropriate. Always simplify expressions. BOX final short answers. LABEL parts of problem. Keep answers EXACT (not decimal approximations, if possible).

① Jason leaves Detroit at 2:00 pm and drives at constant speed west along I-96. He passes Ann Arbor, 40 mi from Detroit, at 2:50 pm.

a) After first making a fully labeled graph illustrating the situation, express the distance traveled (d in miles) in terms of the time elapsed (t in hours).

b) Interpret the value of the slope with units in the context of this problem.

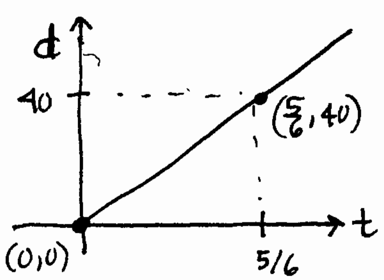
② $f(x) = \sqrt{2x+3}$, $g(x) = x^2+1$

a) What are the domains of f and g? [Use notation like $0 \le x < 1$ or $[0,1)$.]

b) What is $g \circ f$ in simplified form and what is its domain?

c) What is $f \circ g$ in simplified form and what is its domain?

① a)



$m = \dfrac{40-0}{5/6-0} = \frac{6}{5}(40) = \boxed{48 \text{ (mi/hr)}}$

$d - 0 = 48(t-0) \rightarrow \boxed{d = 48t}$ easy!

note: no need for function notation $d(t) = \ldots$ since we are not evaluating d at a t value

b) Jason is driving at a speed of 48 mph.

② a) $f(x) = \sqrt{\underbrace{2x+3}_{\ge 0}}$: $2x+3 \ge 0$, $2x \ge -3$,

domain (f): $\boxed{x \ge -3/2 \text{ or } [-3/2, \infty)}$

$g(x) = x^2+1$ no problems, so domain (g) : $\boxed{x \in \mathbb{R} \text{ or } (-\infty, \infty)}$

b) $(g \circ f)(x) = g(\underbrace{f(x)}) = g(\sqrt{2x+3}) = (\sqrt{2x+3})^2 + 1 = (2x+3) + 1 = \boxed{2x+4}$

but $x \in$ domain(f) : domain $(g \circ f)$ = domain(f) : $\boxed{x \ge -3/2}$

c) $(f \circ g)(x) = f(g(x)) = f(\underbrace{x^2+1}_{\ge 0}) = \sqrt{2(x^2+1)+3} = \boxed{\sqrt{2x^2+5}}$

≥ 0 so automatically in domain (f) — no problem; domain$(f \circ g)$: $\boxed{x \in \mathbb{R}}$

note: $2x+4$ defines a new function with domain $(-\infty, \infty)$ but it is not the composed function $g \circ f$ which carries domain information of f with it.