

Directions: *Please show all of your work. Full credit will only be given when work is clearly presented. Use appropriate units and labels.*

(5 points each)

1.

$$f(x) = 6x^2 + 5$$

$$g(x) = x - 7$$

$$h(x) = 3x$$

$$j(x) = 7$$

Compute $f(g(h(x)))$

Compute $h(g(f(x)))$

Compute $j(g(f(x)))$

(10 points each)

2. Mandy was in Chicago during the summer thunderstorms. It began raining at 9:00am and did not stop until 1:00pm that same day. It rained at a rate of $\frac{3}{4} \frac{\text{inch}}{\text{hour}}$. From 1:00pm to 4:00pm, the sun came out. Another storm rolled in at 4:00pm and rained $2 \frac{\text{inches}}{\text{hour}}$ until 6:00pm.

a) Find a multi-part function giving the total amount of rain in Chicago after t hours (Set $t = 0$ at 9:00am).

b) How many inches of rain has there been by 5:00pm?

(10 points each)

3. Find

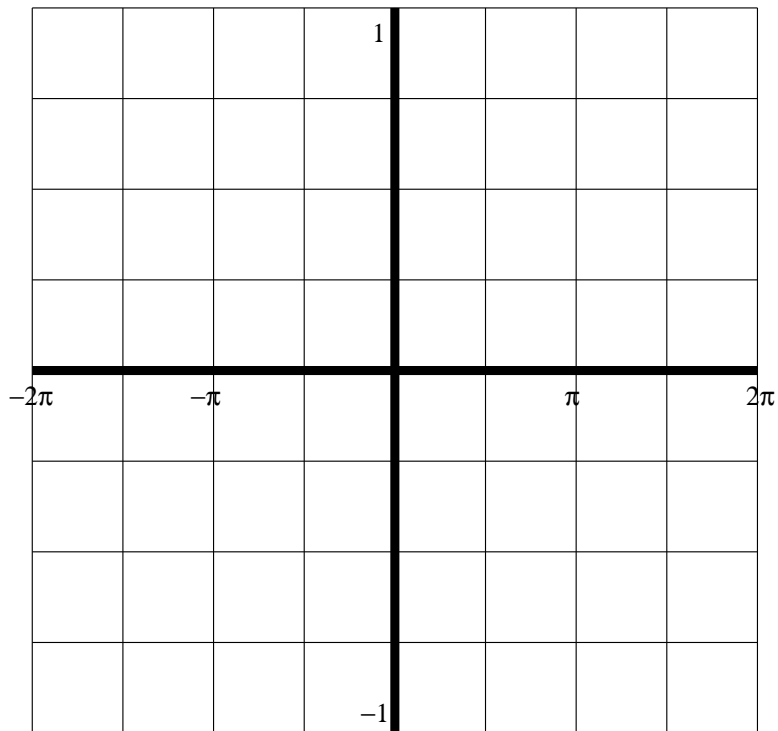
$$\frac{f(x + 2h) - f(x)}{3h}$$

a. when $f(x) = 7$, for all x

b. when $f(x) = x^2 + 2$

(5 points each)

4. Given the following graph of $f(x)$:



a. Sketch the graph of $-\frac{1}{2}f(-2x + \pi) + 1$ on the same coordinate system.

b. State the domain and range of $f(x)$.

c. State the domain and range of $-\frac{1}{2}f(-2x + \pi) + 1$.

(10 points each)

5. Roger is lucky enough to see his favorite band in a small amphitheater. He has a position $(0,10)$, as shown. He throws a glowstick toward the stage and watches its parabolic path. It has been determined that the greatest height the glowstick reaches is 334 feet, which is 36 horizontal feet from Roger.

a. Find a quadratic equation to model the glowstick's path.

b. Find a multi-part function, $h(x)$, that gives the height of the glowstick above the ground. What is the height of the glowstick above the ground 5 horizontal feet away from Roger?

(10 points)

6. Dustin the Duck is 6 yards South and 2 yards West of the center of a circular pond which has a 5 yard radius. Dustin heads in a straight line toward his nest, which is 3 yards East and 4 yards North of the center of the pond. The nest is on the edge of the pond. If Dustin walks at $2 \frac{\text{feet}}{\text{sec}}$ and swims at $6 \frac{\text{feet}}{\text{sec}}$, when does he reach the nest?