

MATH 120A - Winter 2003
Exam 1, Version 1 - Hints and Answers

1. Similar to problem 5.2 from HW 2.

ANSWER: $\frac{f(a+h) - f(a)}{h} = 5 - 2a - h$

2. Similar to problem 8.9 from HW 4.

- (a) HINT: The only values that you can plug into f are those values between -4 and 10 . So, the domain of g is the set of all x such that $-4 \leq \frac{1}{2}(x+1) \leq 10$. The range of g is the same as the range of f .

ANSWER: $D_g = [-9, 19]$, $R_g = [0, 9]$

- (b) HINT: The domain of h is the same as the domain of f . The range of h consists of the values you get from taking the numbers in the range of f , multiplying by $\frac{1}{2}$ and adding 1 .

ANSWER: $D_h = [-4, 10]$, $R_h = [1, 5.5]$

3. Similar to problem 2.6, done in class, and 5.9 from HW 3.

HINT: You have x feet of pipe at \$12 per foot along the road. The length of pipe off the road is the hypotenuse of a right triangle whose legs have length $700 - x$ feet and 450 feet. Use the Pythagorean Theorem to find the length of the hypotenuse in feet. This length costs \$17 per foot.

ANSWER: $C(x) = \$12x + \$17\sqrt{450^2 + (700 - x)^2}$

4. Similar to problem 4.5, done in class.

- (a) HINT: You want the line that goes through the points $(0, 75)$ and $(8, 304)$.

ANSWER: $D(t) = 28.625t + 75$

- (b) HINT: You want the line that goes through the points $(0, 210)$ and $(8, 490)$.

ANSWER: $B(t) = 35t + 210$

- (c) HINT: Set $D(t) = 250$, solve for t and plug the resulting value into $B(t)$.

ANSWER: 424 books

- (d) HINT: Set $B(t) = 2D(t)$ and solve for t .

ANSWER: $t = 2.70$ years OR during the year 1997

5. Contains elements of problem 3.7 from HW 2, 3.9 done in class, 4.7 from HW 2, and Chapter 1.

(a) ANSWER: $(x - 70)^2 + (y - 40)^2 = 50^2$

- (b) HINT: Compute $(100 - 70)^2 + (10 - 40)^2$. What does it mean if this number is less than 50^2 ?

ANSWER: The boulder does lie in the field.

- (c) HINT: Set $y = 0$ in the equation for the circle in part (a) and solve for x . You should get two values ($x = 40$ and $x = 100$). Farmer Jones walks 40 yards at 4 miles per hour.

ANSWER: 20.45 seconds

6. Contains elements of problem 7.1 done in class, 7.2 from HW 3, 7.5 from HW 3, and 6.10 from HW 3.

- (a) HINT: Find the y -coordinate of the point on the parabola when $x = 30$. That is, plug $x = 30$ into the formula for the parabola.

ANSWER: 172 feet

- (b) HINT: You want the y -coordinate of the vertex. You should note that the parabola is already in vertex form.

ANSWER: 217 feet

- (c) HINT: Find where the parabola crosses the x -axis by setting $-\frac{45}{529}(x-53)^2 + 217$ equal to 0 and solving for x . This will give the x -intercept. You must subtract 30 to get the distance from the base of the cliff.

ANSWER: 73.51 feet

- (d) ANSWER:
$$h(x) = \begin{cases} 172 & \text{if } 0 \leq x \leq 30 \\ -\frac{45}{529}(x-53)^2 + 217 & \text{if } 30 \leq x \leq 103.51 \end{cases}$$