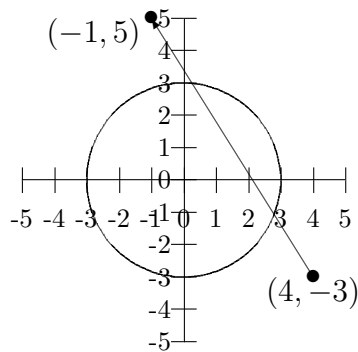


MATH 120A - Spring 2003
Exam 1, Version 1 - Hints and Answers

1. (a) (4 points) HINTS: $f(2a) = 24a^3 - 16a^2 + 2a$, $f(2a) - f(a) = 21a^3 - 12a^2 + a$
ANSWER: $\frac{f(2a) - f(a)}{a} = 21a^2 - 12a + 1$
- (b) (4 points) ANSWER: $y = -\frac{8}{7}x + 13$
2. (a) (2 points) ANSWER: $D_f = [-2, 6]$, $R_f = [1, 5]$
- (b) (4 points) HINT: You can tell from the graph that there will be two answers. Set $-2x + 1 = \frac{3}{2}$ and $x + 1 = \frac{3}{2}$. Solve each for x .
ANSWERS: $x = -\frac{1}{4}$ and $x = \frac{1}{2}$
- (c) (4 points) HINT: You need $\frac{3}{2} - f(x) \geq 0$.
ANSWER: $D_g = [-\frac{1}{4}, \frac{1}{2}]$
- (d) (4 points) HINTS: To find the domain, notice that x is in the domain of $h(x)$ if and only if $\frac{1}{2}(x - 5)$ is in the domain of $f(x)$. So, you'll need to solve the inequalities $-2 \leq \frac{1}{2}(x - 5) \leq 6$ for x in order to find the domain of $h(x)$. To find the range of $h(x)$, notice that to get values of $h(x)$, you take values of $f(x)$, multiply by 3 and add 7. What do you get if you do that to all values in the range of $f(x)$?
ANSWERS: $D_h = [1, 17]$, $R_h = [10, 22]$
3. (a) (3 points)



- (b) (4 points) HINT: Use the distance formula to find distance travelled in 10 minutes. Convert speed to miles per hour.
ANSWER: 56.60 mph
- (c) (7 points) HINT: The equation of the boundary of the radar zone is $x^2 + y^2 = 9$. The equation of the plane's path is $y = -1.6x + 3.4$. Find where these intersect.
ANSWER: $(2.80, -1.08)$

4. (a) (4 points) HINT: Find the vertex of graph of $T(t)$. The maximum will occur when $t = 11.2$ years.
ANSWER: $T(11.2) = 2651.2$, round to 2651
- (b) (4 points) HINT: Find the equation of the line through the points $(0, 1070)$ and $(25, 820)$.
ANSWER: $F(t) = -10t + 1070$
- (c) (2 points) HINT: Compute $T(14) - F(14)$.
ANSWER: 1682
- (d) (4 points) HINT: Find a formula for $M(t)$, the male student population in year t : $M(t) = T(t) - F(t)$. This is a parabola that opens down. This function increases from $t = 0$ up to the t -coordinate of the vertex.
ANSWER: from $t = 0$ to $t = 12.2$ years