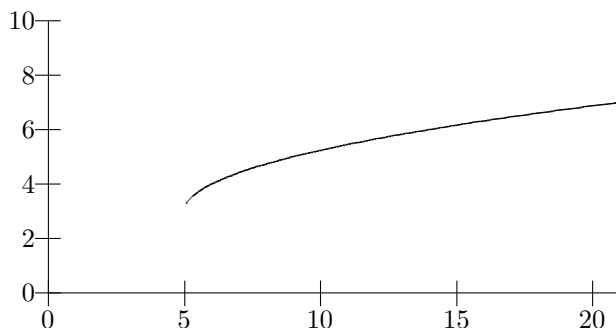


MATH 120 - Winter 2002
Exam 2, Version 1 - Hints and Answers

- ANSWER: The domain is the set of all real x other than -1 and 3 . The zeros are 5 and 1 . The y -intercept is $-\frac{20}{9}$. The horizontal asymptote is the line $y = \frac{4}{3}$. There are two vertical asymptotes: $x = -1$ and $x = 3$.
- (a) HINT: We can tell by the graph that the function is increasing on the given domain. So, the range goes from $f(3)$ up to $f(7)$.
ANSWER: $5 \leq y \leq 21$
- (b) ANSWER: $f^{-1}(x) = 3 + \sqrt{x - 5}$
- (c) ANSWER:



- (a) HINT: Convert both angles to the same units, either radians or degrees, and see which is larger.
ANSWER: $\alpha = 170^\circ$, $\beta = 2.8$ radians
- (b) ANSWER: The period of function A is clearly greater than 5 — there's a peak that occurs just to the left of the line $x = 5$ and the next peak does not occur until after $x = 10$. But if you look at function B for x between 5 and 10 , it is clear that the period is less than 5 . Thus, function A has the larger period.
- (a) HINT: The high and low values are given. From those, you can deduce the amplitude (2) and the median (5.4). The graph of Elastic Man's height is crossing the median line on its way up at $t = 8$ (which means that the phase shift is 8) and is crossing the median line, on its way down for the first time, 28 hours later. So, from $t = 8$ to $t = 8 + 28 = 36$, we have one hump of the sine curve, which requires precisely half of the period.
ANSWER: $h(t) = 2 \sin \left[\frac{2\pi}{56}(t - 8) \right] + 5.4$
- (b) HINT: Solve the equation $7 = 2 \sin \left[\frac{2\pi}{56}(t - 8) \right] + 5.4$ for t . Then use symmetry and the fact that Elastic Man reaches his maximum height at $t = 22$ to find another time.

ANSWER: $t = 16.26$ hours (about 4:30 p.m. today) and $t = 27.74$ hours (about 3:45 a.m. tomorrow) are two possible answers. There are infinitely many correct answers.

5. (a) ANSWER: $\omega = 0.1$ radians per second
- (b) ANSWER: $(-148.50, 21.17)$
- (c) ANSWER: $(-7.00, -119.80)$
- (d) HINT: Measure each dog's angle at time t from the positive x -axis. Tiny Jim's angle is $0.1t$. Ollie's angle is $\frac{\pi}{2} - 0.16t$. The angle between them is $\frac{\pi}{2} - 0.16t - 0.1t$.
ANSWER: $t = 6.04$ seconds