MATH 120 - Autumn 2001
Exam 2, Version 1 - Hints and Answers

1. (a) ANSWER (in verbal form): There is a zero at $x = -4$ (the graph crosses the x-axis at $x = -4$). The line $x = 3$ is the only vertical asymptote. The line $y = 1$ is the horizontal asymptote. The y-intercept is $-\frac{4}{3}$.

   (b) HINT: Recall that $g(x) = y \Leftrightarrow g^{-1}(y) = x$. You want $x = g^{-1}(10)$. So, set $g(x) = 10$ and solve for x.
   ANSWER: $g^{-1}(10) = \frac{34}{9}$

2. (a) HINT: $f(t) = 5u(t) = \begin{cases} 0 & \text{if } t < 0 \\ 5 & \text{if } 0 \le t \le 1 \\ 0 & \text{if } 1 < t \end{cases}$
   Now sketch the graph.

   (b) HINT: $g(t) = -u(t-3) = \begin{cases} 0 & \text{if } t < 3 \\ -1 & \text{if } 3 \le t \le 4 \\ 0 & \text{if } 4 < t \end{cases}$
   Now sketch the graph.

   (c) HINT: Use the graphs from parts (a) and (b).
   ANSWER: $h(t) = f(t) + g(t) = \begin{cases} 0 & \text{if } t < 0 \\ 5 & \text{if } 0 \le t \le 1 \\ 0 & \text{if } 1 < t < 3 \\ -1 & \text{if } 3 \le t \le 4 \\ 0 & \text{if } 4 < t \end{cases}$

3. ANSWER: $\dfrac{5\pi}{24}$ radians

4. HINT: Let z be the length of the string. Then,
$$\sin 57^\circ = \frac{96}{z}.$$
   ANSWER: $z = 114.47$ feet

5. (a) ANSWER: 4.2857 RPM

   (b) ANSWER: 0.2295 miles

   (c) ANSWER: $D(t) = 15 \sin\left[\dfrac{2\pi}{14}(t - 3.5)\right] + 20$