# Some Sample Problems for Exam 1

These are only a *few* sample problems to *help* you prepare for the exam. You should also be certain that you completely understand the WeBWorK assignments, Problems Sets, Reading Assignments, in-class work, and your class notes.

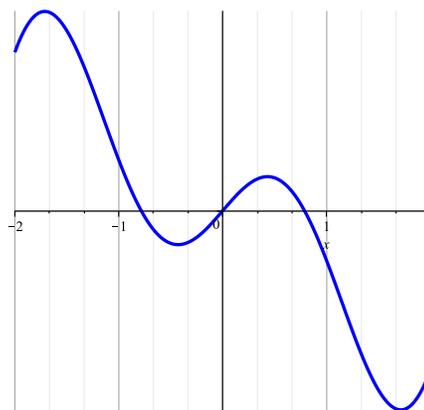1. Let $f(x) = \dfrac{2x^2 + x - 6}{x^2 - 3x - 10}$

   (a) Where is f continuous? Give your answer in interval notation.

   (b) Does f have any vertical asymptotes? If so, where? What is the behavior of f on each side of the asymptote(s)?

   (c) Does f have any horizontal asymptotes? If so, where?

2. The graph of $y = f(x)$ is shown below. Let $F(x)$ be an antiderivative of $f(x)$.
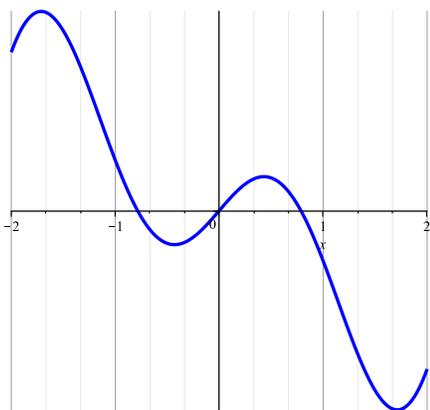
Graph of y=f(x)

(a) Sketch the graph of $y = f'(x)$

Graph of y=f(x)

(b) Sketch the graph of $y = F(x)$

3. Show that $f(x) = 4x^2 - 10x + 3\cos(x)$ has a local minimum value between $x = 1$, and $x = 3$. Approximate the x-value where the minimum occurs accurate within 0.2 of its exact value.

4. Use the definition of the derivative to find $f'(3)$ if $f(x) = 5x^2 - 2x$.

5. Find equation of the line tangent to $y = 8x^3 - \dfrac{12}{x^2} + 3e^x$ at $x = 1$.

6. The height H, in feet above ground, of the Hood blimp is recorded t hours after 12:00 noon on Sunday, September 9, and is given by $H(t) = t^5 - 7t^4 - 5t^3 + 75t^2$

   (a) What are the units of $H'(t)$? What are the units of $H''(t)$?

   (b) What is the height of the blimp at 1:00 pm?
   Is the blimp rising or falling at 1:00 pm? At what rate?
   Is the blimp is accelerating or decelerating at 1:00 pm? At what rate?

   (c) Repeat (b) for 2:00 pm and 4:00 pm.