# 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 $f(x) = \dfrac{4x^3 + 5}{-2x^3 - 16}$

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

   (b) Does $f$ have any vertical asymptotes? If so, where?

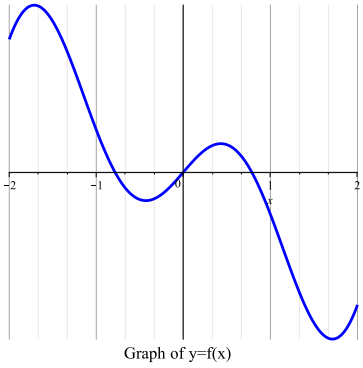
   (c) Does $f$ have any horizontal asymptotes? If so, where?

2. The graph of $y = f(x)$ is shown to the right.

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

   (b) Suppose $F(x)$ is a function where $F'(x) = f(x)$.

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



Graph of y=f(x)

3. Find the exact solutions to the following equations.

   (a) $5\ln(x^2 + 2) = 15$

   (b) $e^{3x}\ln(x + 2) - 7e^{3x} = 0$

4. Find all solutions to $2\cos(\theta)^2 - \cos(\theta) - 1 = 0$ that lie in the interval $[0, 2\pi)$.

5. Use the definition of the derivative to find $f'(3)$ if $f(x) = 5x^2 - 2x + 1$.

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

7. Show that $f(x) = x\cos(x^2) - 3x^2 + 10$ has a root between $x = 1$ and $x = 3$ and approximate it's value accurate within 0.2 of its exact value.

8. Find the derivative of the following functions

   (a) $g(x) = (\sqrt{x} - x^3 + 12x + 9)(12x^{5/4} + 3x - 4x^2 + 11)$

   (b) $h(x) = \dfrac{2x^3 + 3x + 1}{x - 7\sqrt{x}}$