1. Find the derivative of the following functions.

   (a) $A(x) = \ln(2x^3 + x^2 - 5x + 8)$.

   (b) $B(x) = \dfrac{4\ln x}{3x}$.

   (c) $C(x) = \log_3 \sqrt{x}$.

   (d) $D(x) = 7^{2x^2+3x+1}$.

   (e) $E(x) = xe^{3x}$.

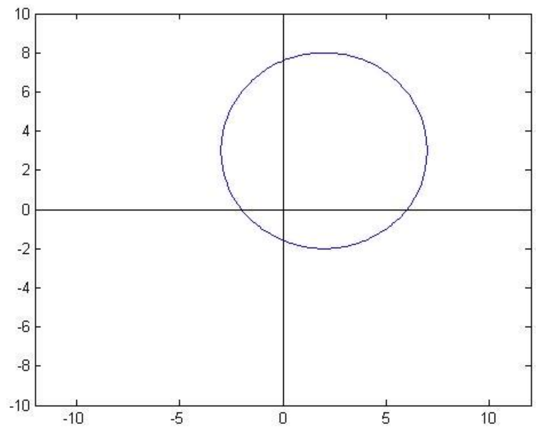
   (f) $F(x) = \dfrac{5^x}{e^x - 1}$.

   (g) $G(x) = \ln\left(\dfrac{x^2}{3x+2}\right)$.

   (h) $H(x) = (\log_5 x)^4$.

2. Use implicit differentiation to find $\frac{dy}{dx}$ if $4x^3 - 3xy + 7y^3 = 0$.

3. The graph of the equation $(x-2)^2 + (y-3)^2 = 25$ is a circle of radius 5 centered at the point $(2, 3)$ (see the graph below). Find the equation of the line tangent to this circle at the point $(-1, -1)$, and draw it on the graph of the circle given.



4. Determine $\frac{dx}{dt}$ for $5x^2 + \sqrt{y} = 6xy$ given that $x = 1$, $y = 1$, and $\frac{dy}{dt} = 2$.

5. On a warm and sunny winter day, a snowball that is 48 inches in diameter is melting. It's volume is decreasing at a rate of 576π cubic inches per minute. How fast is the radius of the snowball decreasing? The volume of a sphere is $V = \frac{4}{3}\pi r^3$.

6. Let $f(x) = \frac{1}{3}x^3 - \frac{3}{2}x^2 - 10x + 4$.

   (a) Identify the critical values of f.

   (b) Find the interval(s) on which f is increasing/decreasing.

   (c) Find the values of x for which f has a relative min or relative max.

7. Let $f(x) = x \cdot \ln(4x) - 2x^2$.

(a) Write the domain of f in interval notation.

(b) Find $f'(x)$ and $f''(x)$.

(c) Find the interval(s) on which f is concave up/down.

(d) Find any inflection point(s). Write your answer as ordered pair(s).

8. Consider the function $f(x) = \frac{1}{3}x^3 + \frac{3}{2}x^2 - 40x + 2$ on the interval $[-12, 12]$. Find the absolute max and absolute min of f on this interval.

9. Suppose you want to make an open-top box out of a piece of corrugated cardboard that is 25 by 40 inches. In order to do this, you need to cut out small squares from each corner and fold up the flaps. Determine the dimensions of the box if its volume is to be maximum.

10. Consider $f(x) = 12 \ln x - 7x + \frac{1}{2}x^2$ on the interval $(0, 5)$.

    (a) Determine the critical points.

    (b) Use the second derivative test to determine the values of x for which f has a relative min or relative max.