1. A disease is spreading in our class at a rate proportional to the number of infected people. If at time $t = 0$ hours, one person is infected, and after one hour, two people are infected, how long will it take for the disease to infect all 24 of us?

2. Alfred and Betsy start running from the same point at the same time. Alfred runs north at a speed of 3 m/s, while Betsy runs east at a speed of 4 m/s. At time $t = 2$ seconds, how fast is the distance between Alfred and Betsy increasing?

3. Use a linear approximation to show that for small values of $\theta$, $\sin(\theta) \approx \theta$. (Note: this is intuitive evidence, but not proof, that $\lim_{\theta \to 0} \sin'(\theta)/\theta = 1$.)

4. (a) Use the Intermediate Value Theorem to show that there is $c$ with $0 < c < \pi/2$ and $\cos(c) = 2/\pi$.

   (b) Use the Mean Value Theorem to show that there is $c$ with $0 < c < \pi/2$ and $\cos(c) = 2/\pi$.

5. Find a pair of numbers whose difference is 2 and whose product is minimal.

6. Estimate the $x$-value for the point of intersection of the graphs of $y = x^3 + 3x$ and $y = 3x - 4$ using Newton’s Method with an initial estimate of $x_1 = -1$. You should use this method 2 times to obtain estimates $x_2$ and $x_3$. 