The coordinates of the base point is (0, 1) (y-intercept).
So, the second lines are: (using results from #6)

\[ y = -0.632x + b \]
\[ 1 = -0.632(0) + b \rightarrow b = 1 \quad \implies \quad G_s(t) = -0.632t + 1 \]

\[ y = -0.787x + b \]
\[ 1 = -0.787(0) + b \rightarrow b = 1 \quad \implies \quad G_s(t) = -0.787t + 1 \]

\[ y = -0.95x + b \]
\[ 1 = -0.95(0) + b \rightarrow b = 1 \quad \implies \quad G_s(t) = -0.95t + 1 \]

\[ y = -0.995x + b \]
\[ 1 = -0.995(0) + b \rightarrow b = 1 \quad \implies \quad G_s(t) = -0.995t + 1 \]

18. It looks like the slopes are getting close to -1.0.
   So, the tangent line is \( G(t) = 1 - t = -t + 1 \)
24(a) \[ g'(t) = \lim_{\Delta t \to 0} \frac{\Delta g}{\Delta t} \]

24(b) \[ b(t) = (1 + 2t)^3 \quad b_0 = 1 \]

a) \[ \Delta t = 1 \quad \text{avg rate of change} = \frac{b(1) - b(0)}{1 - 0} = \frac{27 - 1}{1} = 26 \]

b) \[ \Delta t = 0.1 \quad \text{avg rate of change} = \frac{b(0.1) - b(0)}{0.1 - 0} = 7.28 \]

c) \[ \Delta t = 0.01 \quad \text{avg rate of change} = \frac{b(0.01) - b(0)}{0.01 - 0} = 6.1208 \]

d) \[ \Delta t = 0.0001 \quad \text{avg rate of change} = \frac{b(0.0001) - b(0)}{0.0001} = 6.012 \]

e) The slopes seem to be approaching 6.

The equation was not required, but from the graph it would be \( b(t) = 6t + 1 \).
Math 1220  HW 

Sec 2.2: 2, 3, 8, 10, 14, 24, 28, 32

2. \( \lim_{x \to 0} \frac{1 - \cos(x)}{x^2} = 0 \)

3. \( \lim_{x \to 0} \frac{1 - \cos(x)}{x} = 0 \)

It seems to be limiting to zero from both the graph and the table.

5. \( \lim_{x \to 1^+} \sqrt{x} = 1 \)

It seems to be limiting to 0. It's clearer from the table than the graph due to how the calculator renders images.

10. \( \lim_{x \to 0} \frac{3 \sin(x)}{x} + 4 = 3 \lim_{x \to 0} \frac{\sin(x)}{x} + \lim_{x \to 0} 4 = 3(1) + 4 = 7 \)

14. \( f_2(x) = x \)

\( f_2(x) = 0.1 \) or \( f_2(x) = -0.1 \)

\( f_2(x) = x \) is within 0.1 of 0 such that the input, \( x \), must be within 0.1 of 0.

\( |x - 0.1| = 0.1 \)

\( |x + 0.1| = 0.1 \)

24. \( \lim_{x \to 1^+} f(x) = 2 \)

\( \lim_{x \to 1^-} f(x) = 0 \)
28. \( f(x) = 5x^2 \) near \( x = 1 \)

The average rate of change is given by:

\[
\frac{\Delta f}{\Delta x} = \frac{f(1 + \Delta x) - f(1)}{\Delta x} = \frac{5(1 + \Delta x)^2 - 5}{\Delta x} = \frac{5(1 + 2\Delta x + (\Delta x)^2) - 5}{\Delta x}
\]

\[
= \frac{5 + 10\Delta x + 5(\Delta x)^2 - 5}{\Delta x} = \frac{10\Delta x + 5(\Delta x)^2}{\Delta x} = 10 + 5\Delta x
\]

Now, \( \lim_{\Delta x \to 0} \frac{\Delta f}{\Delta x} = \lim_{\Delta x \to 0} 10 + 5\Delta x = 10 \)

32. \( H(t) = \frac{10}{1+t} \)

a) \( \lim_{t \to 0^+} \frac{10}{1+t} = 10 \)

b) \( H(2) = \frac{10}{1+2} = \frac{10}{3} \approx 3.3 \quad \text{Distance } |10 - 3.3| = 6.7 \)

c) \( H(1) = \frac{10}{1+1} = \frac{10}{2} = 5 \quad \text{Distance } |10 - 5| = 5 \)

d) \( \% \downarrow 10 = 0.1 \quad \text{So, } H(T) = 10 - 0.1 = 9.9 \)

\[ H(T) = \frac{10}{1+T} = 9.9 \]

\[ 10 = 9.9(1+T) \]

\[ 10 = 9.9 + 9.9T \]

\[ 0.1 = 9.9T \]

\[ T = 0.01 \text{°K} \]