

p210 # 1, 2, 4-10

time	temp		
0	185	$m = 172 - 160 = -1.2^\circ\text{F}/\text{min}$	$L(30) = 148^\circ$
10	172	$10 - 20$	f'
20	160	$y - 160 = -1.2(x - 20)$	-1.3 } Increasing
30	?	$L = -1.2x + 184$	-1.2 } $\therefore f''$ is pos

cu

so estimate is below the curve, under estimate

altitude	pressure		
0	101.3	$m = 87.1 - 74.9 = -12.2 \text{ kilopascals}/\text{km}$	
1 km	87.1	$1 - 2$	
2 km	74.9	$y - 74.9 = -12.2(x - 2)$	$L(3) = 62.7 \text{ kPa}$
3 km	?	$L = -12.2x + 99.3$	

4	$m = \frac{17 - 15}{1985 - 1980} = 2$	1985	$y - 17 = \frac{2}{5}(x - 1985)$	$L(1984) = 16.6$
	(1985, 17)		$L = \frac{2}{5}x - 778$	million

	$m = \frac{24.9 - 22}{2000 - 1995} = .58$	$y - 24.9 = .58(x - 2000)$	$L(2006) = 28.38$
	(2000, 24.9)	$L = .58x - 1135.1$	million

5	$f(1) = 1^3 = 1$ (1, 1)	6	$f(0) = \frac{1}{\sqrt{2+0}} = \frac{1}{\sqrt{2}}$	$f(x) = (2+x)^{-1/2}$
	$f'(x) = 3x^2$			
	$f'(1) = 3 = m$		$f'(x) = -\frac{1}{2}(2+x)^{-3/2}$	$y - \frac{1}{\sqrt{2}} = -\frac{1}{4\sqrt{2}}(x - 0)$
	$y - 1 = 3(x - 1)$		$f'(0) = -1$	
	$L = 3(x - 1) + 1$		$2(\sqrt{2+0})^3$	$L = \frac{-1}{4\sqrt{2}}x + \frac{1}{\sqrt{2}}$
	$L = 3x - 2$			

$$\textcircled{7} \quad f\left(\frac{\pi}{2}\right) = \cos \frac{\pi}{2} = 0$$

$$\left(\frac{\pi}{2}, 0\right)$$

$$f'(x) = -\sin x$$

$$f'\left(\frac{\pi}{2}\right) = -1 = m$$

$$y - 0 = -1\left(x - \frac{\pi}{2}\right)$$

$$\boxed{L = -x + \frac{\pi}{2}}$$

$$\textcircled{8} \quad f(-8) = \sqrt[3]{-8} = -2$$

$$(-8, -2)$$

$$f'(x) = \frac{1}{3}(x)^{-\frac{2}{3}}$$

$$f'(-8) = \frac{1}{3\sqrt[3]{(-8)^2}} = \frac{1}{3 \cdot 4} = \frac{1}{12} = m$$

$$y + 2 = \frac{1}{12}(x + 8)$$

$$L = \frac{1}{12}(x + 8) - 2$$

$$\boxed{\cancel{L = \frac{1}{12}x - \frac{4}{3}}}$$

$$\textcircled{9} \quad f(0) = \sqrt{1-0} = 1$$

$$(0, 1)$$

$$f'(x) = \frac{1}{2}(1-x)^{-\frac{1}{2}}(-1)$$

$$f'(0) = -\frac{1}{2}$$

$$y - 1 = -\frac{1}{2}(x - 0)$$

$$\boxed{L = -\frac{1}{2}x + 1}$$

$$\sqrt{1-x} = \sqrt{.9}$$

$$x = .1$$

$$L(.1) = .05 + 1$$

$$\boxed{L(.1) = .95 \approx \sqrt{.9}}$$

$$\sqrt{1-x} = \sqrt{.99}$$

$$x = .01$$

$$L(.01) = .005 + 1$$

$$\boxed{L(.01) = .995 \approx \sqrt{.99}}$$

$$\textcircled{10} \quad g(0) = \sqrt[3]{1+0} = 1$$

$$(0, 1)$$

$$g'(x) = \frac{1}{3}(1+x)^{-\frac{2}{3}}(1)$$

$$g'(0) = \frac{1}{3(\sqrt[3]{1+0})^2} = \frac{1}{3}$$

$$y - 1 = \frac{1}{3}(x - 0)$$

$$\boxed{L = \frac{1}{3}x + 1}$$

$$\sqrt[3]{1+x} = \sqrt[3]{.95}$$

$$x = .05$$

$$L(.05) = \frac{.05}{3} + 1$$

$$\boxed{L(.05) = \frac{2.95}{3} = .983 \approx \sqrt[3]{.95}}$$

$$\sqrt[3]{1+x} = \sqrt[3]{1.1}$$

$$x = .1$$

$$L(.1) = \frac{.1}{3} + 1$$

$$\boxed{L(.1) = \frac{3.1}{3} = 1.033 \approx \sqrt[3]{1.1}}$$