

MATH 112 SOLUTIONS FOR 2.1, P.100

1. (a) 8; 14.4; 15.84. (b) about 16.
 (c) -32 ft/sec, -24 ft/sec, -17.6 ft/sec, -16.8 ft/sec
 (d) about -16 ft/sec (e) The negative sign indicates motion downward.
2. (a) 19.67; 19.74; 19.79. (b) about 19.8.
4. \$96.58 per year, \$94.67 per year, \$93.18 per year. At $t = 2$, the rate of change is about \$92.81 per year, which is about 7.92% of $A(2)$. $A(t) = 1000(1.02)^{4t} = 1000(1 + \frac{.08}{4})^{4t}$, so this is compounding 4 times per year at 8%.
5. (a) 25.66, 36.8; 3.47, 4.98; 0.47, 0.67. (b) about 40; about 6; about 1. [Actual: 40.6, 5.49, 0.74.] (c) The velocity will approach 150 and acceleration will approach 0.
8. The slope at a is about -1 . No tangent line exists at 1 or at -1 .
9. The slope at a is about -2 . No tangent line exists at -1 or at 2.
12. (a) 8.1, 25.5, and 16.8 people per year. The last is indeed the average of the first two.
 (c) about 16.8 people per year (using the average growth rate over [1960, 1980]).
 (d) 1980: Use the average for [1970, 1990], which is 31.6 people per year.
 1990: Use the average for [1980, 2000], which is 49.25 people per year.
13. If $b = a + h$, then $b \rightarrow a$ if and only if $h \rightarrow 0$. Hence the result, upon substitution.
14. If $b = a + h$, then $b - a = h$ and $b \rightarrow a$ if and only if $h \rightarrow 0$. Hence, by substitution, $m_{\tan} = \lim_{b \rightarrow a} \frac{f(b) - f(a)}{b - a} = \lim_{h \rightarrow 0} \frac{f(a + h) - f(a)}{h}$.
16. (a) The slope of $Q(t) = b + mt$ is m , which is the rate of change.
 (b) $Q'(t) = \lim_{a \rightarrow t} \frac{Q(a) - Q(t)}{a - t} = \lim_{a \rightarrow t} \frac{(b + ma) - (b + mt)}{a - t} = \lim_{a \rightarrow t} m = m$.