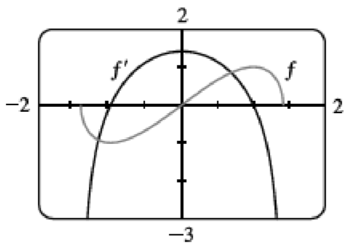
35. $y = (1+2x)^{10} \quad \Rightarrow \quad y' = 10(1+2x)^9 \cdot 2 = 20(1+2x)^9$. At $(0,1)$, $y' = 20(1+0)^9 = 20$, and an equation of the tangent line is $y - 1 = 20(x-0)$, or $y = 20x + 1$.

39. (a) $f(x) = x\sqrt{2-x^2} = x(2-x^2)^{1/2} \quad \Rightarrow$

$$f'(x) = x \cdot \tfrac{1}{2}(2-x^2)^{-1/2}(-2x) + (2-x^2)^{1/2} \cdot 1 = (2-x^2)^{-1/2}[-x^2 + (2-x^2)] = \frac{2-2x^2}{\sqrt{2-x^2}}$$

(b)



$f' = 0$ when f has a horizontal tangent line, f' is negative when f is decreasing, and f' is positive when f is increasing.

42. $h(x) = \sqrt{4+3f(x)} \quad \Rightarrow \quad h'(x) = \frac{1}{2}(4+3f(x))^{-1/2} \cdot 3f'(x)$, so
$h'(1) = \frac{1}{2}(4+3f(1))^{-1/2} \cdot 3f'(1) = \frac{1}{2}(4+3\cdot 7)^{-1/2} \cdot 3 \cdot 4 = \frac{6}{\sqrt{25}} = \frac{6}{5}$

44. (a) $F(x) = f(f(x)) \quad \Rightarrow \quad F'(x) = f'(f(x)) \cdot f'(x)$, so $F'(2) = f'(f(2)) \cdot f'(2) = f'(1) \cdot 5 = 4 \cdot 5 = 20$.
(b) $G(x) = g(g(x)) \quad \Rightarrow \quad G'(x) = g'(g(x)) \cdot g'(x)$, so $G'(3) = g'(g(3)) \cdot g'(3) = g'(2) \cdot 9 = 7 \cdot 9 = 63$.

46. (a) $h(x) = f(f(x)) \quad \Rightarrow \quad h'(x) = f'(f(x))f'(x)$. So $h'(2) = f'(f(2))f'(2) = f'(1)f'(2) \approx (-1)(-1) = 1$.
(b) $g(x) = f(x^2) \quad \Rightarrow \quad g'(x) = f'(x^2) \cdot \dfrac{d}{dx}(x^2) = f'(x^2)(2x)$. So $g'(2) = f'(2^2)(2 \cdot 2) = 4f'(4) \approx 4(1.5) = 6$.

54. $y = e^{-x^2} \quad \Rightarrow \quad y' = e^{-x^2}(-2x) \quad \Rightarrow \quad y'' = e^{-x^2}(-2) + (-2x)e^{-x^2}(-2x) = 2e^{-x^2}(2x^2-1)$. $\quad y'' = 0 \quad \Leftrightarrow$
$2x^2 - 1 = 0 \quad \Leftrightarrow \quad x = \pm\frac{\sqrt{2}}{2}$. The curve is concave downward when $y'' < 0$. This is the case on the interval $\left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$.

60. (a) $s = A\cos(\omega t + \delta) \quad \Rightarrow \quad$ velocity $= s' = -\omega A \sin(\omega t + \delta)$.
(b) If $A \neq 0$ and $\omega \neq 0$, then $s' = 0 \quad \Leftrightarrow \quad \sin(\omega t + \delta) = 0 \quad \Leftrightarrow \quad \omega t + \delta = n\pi \quad \Leftrightarrow \quad t = \dfrac{n\pi - \delta}{\omega}$, n an integer.