50. $\text{NINT}\left(\frac{2x^4-1}{x^4-1}, x, -0.8, 0.8\right) \approx 1.427$

51. $\frac{1}{2}\text{NINT}\left(\sqrt{\cos x}, x, -1, 1\right) \approx 0.914$

52. $\sqrt{8-2x^2} \geq 0$ between $x = -2$ and $x = 2$

$\text{NINT}(\sqrt{8-2x^2}, x, -2, 2) \approx 8.886$

53. Plot $y_1 = \text{NINT}\left(e^{-t^2}, t, 0, x\right), y_2 = 0.6$ in a [0, 1] by [0, 1] window, then use the intersect function to find $x \approx 0.699$.

54. When $y = 0, x = 1$.

$y^3 = 1 - x^3$

$y = \sqrt[3]{1-x^3}$

$\text{NINT}(\sqrt[3]{1-x^3}, x, 0, 1) \approx 0.883$

55. $\int_a^x f(t)\,dt + K = \int_b^x f(t)\,dt$

$K = -\int_a^x f(t)\,dt + \int_b^x f(t)\,dt$

$= \int_x^a f(t)\,dt + \int_b^x f(t)\,dt$

$= \int_b^a f(t)\,dt$

$K = \int_2^{-1} (t^2 - 3t + 1)\,dt$

$= \left[\frac{1}{3}t^3 - \frac{3}{2}t^2 + t\right]_2^{-1}$

$= \left[-\frac{1}{3} - \frac{3}{2} + (-1)\right] - \left[\frac{8}{3} - 6 + 2\right] = -\frac{3}{2}$

56. To find an antiderivative of $\sin^2 x$, recall from trigonometry that $\cos 2x = 1 - 2\sin^2 x$, so $\sin^2 x = \frac{1}{2} - \frac{1}{2}\cos 2x$.

$K = \int_2^0 \sin^2 t\,dt$

$= \int_2^0 \left[\frac{1}{2} - \frac{1}{2}\cos(2x)\right] dx$

$= \left[\frac{1}{2}x - \frac{1}{4}\sin(2x)\right]_2^0$

$= \left[\frac{1}{2}x - \frac{1}{2}\sin x \cos x\right]_2^0$

$= 0 - \left(1 - \frac{\sin 2 \cos 2}{2}\right) = \frac{\sin 2 \cos 2 - 2}{2} \approx -1.189$

57. (a) $H(0) = \int_0^0 f(t)dt = 0$

(b) $H'(x) = \frac{d}{dx}\left(\int_0^x f(t)\,dt\right) = f(x)$

$H'(x) > 0$ when $f(x) > 0$.

H is increasing on [0, 6].

(c) H is concave up on the open interval where $H''(x) = f'(x) > 0$.

$f'(x) > 0$ when $9 < x \leq 12$.

H is concave up on (9, 12).

(d) $H(12) = \int_0^{12} f(t)dt > 0$ because there is more area above the x-axis than below the x-axis.

$H(12)$ is positive.

(e) $H'(x) = f(x) = 0$ at $x = 6$ and $x = 12$. Since $H'(x) = f(x) > 0$ on [0, 6), the values of H are increasing to the left of $x = 6$, and since $H'(x) = f(x) < 0$ on (6, 12], the values of H are decreasing to the right of $x = 6$. H achieves its maximum value at $x = 6$.

(f) $H(x) > 0$ on (0, 12]. Since $H(0) = 0$, H achieves its minimum value at $x = 0$.

58. (a) $s'(t) = f(t)$. The velocity at $t = 5$ *is* $f(5) = 2$ units/sec.

(b) $s''(t) = f'(t) < 0$ at $t = 5$ since the graph is decreasing, so acceleration at $t = 5$ is negative.

(c) $s(3) = \int_0^3 f(x)dx = \frac{1}{2}(3)(3) = 4.5$ units

(d) s has its largest value at $t = 6$ sec since $s'(6) = f(6) = 0$ and $s''(6) = f'(6) < 0$.

(e) The acceleration is zero when $s''(t) = f'(t) = 0$. This occurs when $t = 4$ sec and $t = 7$sec.

(f) Since $s(0) = 0$ and $s'(t) = f(t) > 0$ on (0, 6), the particle moves away from the origin in the positive direction on (0,6). The particle then moves in the negative direction, towards the origin, on (6, 9) since $s'(t) = f(t) < 0$ on (6, 9) and the area below the x-axis is smaller than the area above the x-axis.

(g) The particle is on the positive side since

$s(9) = \int_0^9 f(x)dx > 0$ (the area below the x-axis is smaller than the area above the x-axis).

59. (a) $s'(3) = f(3) = 0$ units / sec

(b) $s''(3) = f'(3) > 0$ so acceleration is positive.

(c) $s(3) = \int_0^3 f(x)dx = \frac{1}{2}(-6)(3) = -9$ units

(d) $s(6) = \int_0^6 f(x)dx = \frac{1}{2}(-6)(3) + \frac{1}{2}(6)(3) = 0$, so the particle passes through the origin at $t = 6$ sec.

(e) $s''(t) = f'(t) = 0$ at $t = 7$ sec

(f) The particle is moving away from the origin in the negative direction on (0,3) since $s(0) = 0$ and $s'(t) < 0$ on (0, 3). The particle is moving toward the origin on (3, 6) since $s'(t) > 0$ on (3, 6) and $s(6) = 0$. The particle moves away from the origin in the positive direction for $t > 6$ since $s'(t) > 0$.

59. Continued

(g) The particle is on the positive side since $s(9)=\int_0^9 f(x)\,dx>0$ (the area below the x-axis is smaller than the area above the x-axis).

60. $f(x)=\frac{d}{dx}\left(\int_1^x f(t)\,dt\right)=\frac{d}{dx}\left(x^2-2x+1\right)=2x-2$

61. $f'(x)=\frac{d}{dx}\left(2+\int_0^x \frac{10}{1+t}\,dt\right)=\frac{10}{1+x}$

$f'(0)=10$

$f(0)=2+\int_0^0 \frac{10}{1+t}\,dt=2$

$L(x)=2+10x$

62. $f(x)=\frac{d}{dx}\left(\int_0^x f(t)\,dt\right)$

$=\frac{d}{dx}\left(x\cos \pi x\right)$

$=x(-\pi\sin \pi x)+1\cdot\cos \pi x$

$=-\pi x\sin\pi x+\cos\pi x$

$f(4)=-4\pi\sin 4\pi+\cos 4\pi=1$

63. One arch of $\sin kx$ is from $x=0$ to $x=\frac{\pi}{k}$.

Area $=\int_0^{\pi/k}\sin kx\,dx=\left[-\frac{1}{k}\cos kx\right]_0^{\pi/k}=\frac{1}{k}-\left(-\frac{1}{k}\right)=\frac{2}{k}$

64. (a) $\int_{-3}^{2}\left(6-x-x^2\right)dx=\left[6x-\frac{1}{2}x^2-\frac{1}{3}x^3\right]_{-3}^{2}$

$=\frac{22}{3}-\left(-\frac{27}{2}\right)$

$=\frac{125}{6}$

(b) The vertex is at $x=\frac{-(-1)}{2(-1)}=-\frac{1}{2}$. (Recall that the vertex of a parabola $y=ax^2+bx+c$ is at $x=-\frac{b}{2a}$.)

$y\left(-\frac{1}{2}\right)=\frac{25}{4}$, so the height is $\frac{25}{4}$.

(c) The base is $2-(-3)=5$.

$\frac{2}{3}(\text{base})(\text{height})=\frac{2}{3}(5)\left(\frac{25}{4}\right)=\frac{125}{6}$

65. True. The Fundamental Theorem of Calculus guarantees that F is differentiable on I, so it must be continuous on I.

66. False. In fact, $\int_a^b e^{x^2}\,dx$ is a real number, so its derivative is always 0.

67. D.

68. D. See the Fundamental Theorem of Calculus.

69. E. $f(a)+f'(a)(x-\pi)$

$f(\pi)=0$

$f'(\pi)=-1$

$y=-1(x-\pi)=\pi-x$

70. E.

71. (a) $f(t)$ is an even function so $\int_{-x}^{0}\frac{\sin(t)}{t}\,dt=\int_0^x\frac{\sin(t)}{t}\,dt.$

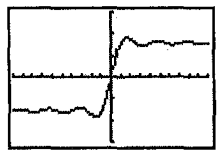
$\text{Si}(-x)=\int_0^{-x}\frac{\sin(t)}{t}\,dt$

$=-\int_{-x}^{0}\frac{\sin(t)}{t}\,dt$

$=-\int_0^x\frac{\sin(t)}{t}\,dt=-\text{Si}(x)$

(b) $\text{Si}(0)=\int_0^0\frac{\sin t}{t}\,dt=0$

(c) $\text{Si}'(x)=f(t)=0$ when $t=\pi k$, k a nonzero integer.

(d) 

$[-20, 20]$ by $[-3, 20, 203]$

72. (a) $c(100)-c(1)=\int_1^{100}\left(\frac{dc}{dx}\right)dx$

$=\int_1^{100}\frac{1}{2\sqrt{x}}\,dx=\left[\sqrt{x}\right]_1^{100}$

$=10-1=9$ or \$9

(b) $c(400)-c(100)=\int_{100}^{400}\left(\frac{dc}{dx}\right)dx$

$=\int_{100}^{400}\frac{1}{2\sqrt{x}}\,dx=\left[\sqrt{x}\right]_{100}^{400}$

$=20-10=10$ or \$10

73. $\int_0^3\left(2-\frac{2}{(x+1)^2}\right)dx=\left[2x+2(x+1)^{-1}\right]_0^3$

$=\left[6+\frac{1}{2}\right]-2=\frac{9}{2}$

$=4.5$ thousand

The company should expect \$4500.

74. (a) $\frac{1}{30-0}\int_0^{30}\left(450-\frac{x^2}{2}\right)dx=\frac{1}{30}\left[450x-\frac{x^3}{6}\right]_0^{30}$

$=300$ drums

(b) (300 drums)(\$0.02 per drum) = \$6

75. (a) True, because $h'(x)=f(x)$ and therefore $h''(x)=f'(x)$.

(b) True because h and h' are both differentiable by part (a).

(c) True, because $h'(1)=f(1)=0$.