2. $\frac{d}{dx}[x\sin x+\cos x+C]=x\cos x+(\sin x)\cdot 1-\sin x+0=x\cos x$

5. $\int(x^2+x^{-2})\,dx=\frac{x^3}{3}+\frac{x^{-1}}{-1}+C=\frac{1}{3}x^3-\frac{1}{x}+C$

10. $\int v(v^2+2)^2\,dv=\int v(v^4+4v^2+4)\,dv=\int(v^5+4v^3+4v)\,dv=\frac{v^6}{6}+4\frac{v^4}{4}+4\frac{v^2}{2}+C=\frac{1}{6}v^6+v^4+2v^2+C$

16. $\int\sec t\,(\sec t+\tan t)\,dt=\int(\sec^2 t+\sec t\,\tan t)\,dt=\tan t+\sec t+C$

25. $\int_{-2}^{2}(3u+1)^2\,du=\int_{-2}^{2}\left(9u^2+6u+1\right)\,du=\left[9\cdot\frac{1}{3}u^3+6\cdot\frac{1}{2}u^2+u\right]_{-2}^{2}=\left[3u^3+3u^2+u\right]_{-2}^{2}$

$=(24+12+2)-(-24+12-2)=38-(-14)=52$

33. $\int_1^4\sqrt{5/x}\,dx=\sqrt{5}\int_1^4 x^{-1/2}\,dx=\sqrt{5}\left[2\sqrt{x}\right]_1^4=\sqrt{5}\,(2\cdot 2-2\cdot 1)=2\sqrt{5}$

51. Since $r(t)$ is the rate at which oil leaks, we can write $r(t)=-V'(t)$, where $V(t)$ is the volume of oil at time t. [Note that the minus sign is needed because V is decreasing, so $V'(t)$ is negative, but $r(t)$ is positive.] Thus, by the Net Change Theorem, $\int_0^{120} r(t)\,dt=-\int_0^{120} V'(t)\,dt=-[V(120)-V(0)]=V(0)-V(120)$, which is the number of gallons of oil that leaked from the tank in the first two hours (120 minutes).

52. By the Net Change Theorem, $\int_0^{15} n'(t)\,dt=n(15)-n(0)=n(15)-100$ represents the increase in the bee population in 15 weeks. So $100+\int_0^{15} n'(t)\,dt=n(15)$ represents the total bee population after 15 weeks.

53. By the Net Change Theorem, $\int_{1000}^{5000} R'(x)\,dx=R(5000)-R(1000)$, so it represents the increase in revenue when production is increased from 1000 units to 5000 units.