1. (Warm-up) Differentiate each function.

   (a) x^7

   (b) $\sqrt{x}$

   (c) $\sqrt[3]{x^2}$

   (d) $\dfrac{5}{x}$

   (e) $\sin x \cos x$

   (f) $\sin(\cos x)$

   (g) $\sin^2 x$

   (h) $x^3 e^{2x}$

2. Evaluate the indefinite integrals.

   (a) $\displaystyle\int x^2\,dx$

   (b) For $n \neq -1$, $\displaystyle\int x^n\,dx$

   (c) $\displaystyle\int \frac{1}{x}\,dx$

   (d) $\displaystyle\int e^u\,du$

   (e) $\displaystyle\int 7^q\,dq$

   (f) For $b > 0$, $\displaystyle\int b^x\,dx$

   (g) $\displaystyle\int \sin\theta\,d\theta$

   (h) $\displaystyle\int \cos\phi\,d\phi$

   (i) $\displaystyle\int \sec^2 v\,dv$

   (j) $\displaystyle\int \sec y \tan y\,dy$

   (k) $\displaystyle\int \frac{1}{1+t^2}\,dt$

   (l) $\displaystyle\int \frac{1}{\sqrt{1-x^2}}\,dx$

3. Evaluate the definite integrals.

   (a) $\displaystyle\int_{-1}^{2} x^4\,dx$

   (b) $\displaystyle\int_{2}^{5} \pi\,dx$

   (c) $\displaystyle\int_{-\pi/2}^{\pi/2} \sin x\,dx$

   (d) $\displaystyle\int_{-\pi/2}^{\pi/2} \cos x\,dx$

4. Evaluate the integrals.

(a) $\int x^{5/2} + \sqrt{x}\, dx$

(b) $\int 6e^m + \cos m + m^3\, dm$

(c) $\int e^{5w}\, dw$

(d) $\int \frac{1}{\cos^2 x}\, dx$

(e) $\int \sqrt{z}(z^2 + 6z + 4)\, dz$

(f) $\int \frac{6y^8 + 12y^2 - y^6}{3y^7}\, dy$