Exercise 1 *For the given function f, evaluate the limit and justify your answer.*

(a) $f(x) = x$

$$\lim_{x \to 7} f(x) = \boxed{7}$$

Justification:
f is continuous at $a = 7$, which implies that $\lim_{x \to 7} f(x) = f(\boxed{7}) = \boxed{7}$.

(b) $f(x) = \sin x$

$$\lim_{x \to \frac{\pi}{2}} f(x) = \boxed{1}$$

Justification:
f is continuous at $a = \dfrac{\pi}{2}$, which implies that

$\lim_{x \to \frac{\pi}{2}} f(x) = f\left(\boxed{\dfrac{\pi}{2}}\right) = \sin\left(\boxed{\dfrac{\pi}{2}}\right) = \boxed{1}$.

(c) $f(x) = e^x$

$$\lim_{x \to 0} f(x) = \boxed{1}$$

Justification:
f is continuous at $a = 0$, which implies that

$\lim_{x \to 0} f(x) = f\left(\boxed{0}\right) = e^{\boxed{0}} = \boxed{1}$.

(d) $f(x) = \ln x$

$$\lim_{x \to e^4} f(x) = \boxed{4}$$

Justification:
f is continuous at $a = e^4$, which implies that

$\lim_{x \to e^4} f(x) = f\left(\boxed{e^4}\right) = \ln\left(\boxed{e^4}\right) = \boxed{4}$.

(e) $f(x) = \cos x$

$$\lim_{x \to \frac{2\pi}{3}} f(x) = \boxed{-\frac{1}{2}}$$

Justification:
f is continuous at $a = \dfrac{2\pi}{3}$, which implies that

$$\lim_{x \to \frac{2\pi}{3}} f(x) = f\Big(\boxed{\frac{2\pi}{3}}\Big) = \cos\Big(\boxed{\frac{2\pi}{3}}\Big) = \boxed{-\frac{1}{2}}.$$

(f) $f(x) = x^3$

$$\lim_{x \to -2} f(x) = \boxed{-8}$$

Justification:
f is continuous at $a = -2$, which implies that

$$\lim_{x \to -2} f(x) = f\Big(\boxed{-2}\Big) = \Big(\boxed{-2}\Big)^3 = \boxed{-8}.$$
