1. $\displaystyle\lim_{x\to 0^+}(1+x)^{1/x}= \lim_{x\to 0^+} e^{\ln(1+x)^{1/x}}= \lim_{x\to 0^+} e^{\frac{1}{x}\ln(1+x)}= \lim_{x\to 0^+} e^{\frac{\ln(1+x)}{x}}= \lim_{x\to 0^+} e^{\frac{1/(1+x)}{1}}= \lim_{x\to 0^+} e^{1/(1+x)} = e^1 = \boxed{e}$

$\uparrow$ $\qquad\qquad\qquad$ $\uparrow$

$\frac{0}{0}$ $\qquad\qquad\qquad$ LH

2. $\displaystyle\int\left(8x^3 - \frac{1}{x^2} + x\right)dx = \int\left(8x^3 - x^{-2} + x\right)dx = 8\frac{x^4}{4} - \frac{x^{-1}}{-1} + \frac{x^2}{2} + C = \boxed{2x^4 + \frac{1}{x} + \frac{x^2}{2} + C}$

3. $\displaystyle\int\left(\pi\sin(x) + 4\right)dx = \boxed{-\pi\cos(x) + 4x + C}$

4. $\displaystyle\int\left(\sqrt[5]{x} + e^x\right)dx = \int\left(x^{1/5} + e^x\right)dx = \frac{x^{1/5+1}}{1/5+1} + e^x + C = \frac{x^{6/5}}{6/5} + e^x + C = \boxed{\frac{5\sqrt[5]{x^6}}{6} + e^x + C}$

$$= \boxed{\frac{5x\sqrt[5]{x}}{6} + e^x + C}$$

1. $\lim\limits_{x \to 0^+} (1+x)^{1/x} = \lim\limits_{x \to 0^+} e^{\ln(1+x)^{1/x}} = \lim\limits_{x \to 0^+} e^{\frac{1}{x}\ln(1+x)} = \lim\limits_{x \to 0^+} e^{\frac{\ln(1+x)}{x}} = \lim\limits_{x \to 0^+} e^{\frac{1/(1+x)}{1}} = \lim\limits_{x \to 0^+} e^{1/(1+x)} = e^1 = \boxed{e}$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \uparrow \qquad\qquad \uparrow$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \frac{0}{0} \qquad\qquad \text{LH}$

2. $\displaystyle\int \left(10x^4 + 2x^2 - x + \frac{1}{x}\right) dx = 10\frac{x^5}{5} + 2\frac{x^3}{3} - \frac{x^2}{2} + \ln|x| + C = \boxed{2x^5 + \frac{2}{3}x^3 - \frac{1}{2}x^2 + \ln|x| + C}$

3. $\displaystyle\int \left(1 + \sec^2(x)\right) dx = \boxed{x + \tan(x) + C}$

4. $\displaystyle\int \left(5e^x + \sqrt{x}\right) dx = \int \left(5e^x + x^{1/2}\right) dx = 5e^x + \frac{x^{1/2+1}}{1/2+1} + C = 5e^x + \frac{x^{3/2}}{3/2} + C = \boxed{5e^x + \frac{2\sqrt{x^3}}{3} + C}$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad = \boxed{5e^x + \frac{2}{3}x\sqrt{x} + C}$