Subject:

Date:

بنام خدا — تلما محسنی — ۲۰

۱. $$\lim_{x\to 1} \frac{4(x-1)\left(x-\frac{3}{4}\right)}{5(x-1)\left(x-\frac{3}{5}\right)} = \boxed{\frac{1}{2}}$$

۲. $$\lim_{x\to 0} \frac{|3x-1|-|3x+1|}{x} = \frac{1-3x-3x-1}{x} = \boxed{-6}$$

۳. $$\lim_{x\to 4} \frac{x-4}{\sqrt{x}-2} = \frac{(\sqrt{x}+2)(\sqrt{x}-2)}{\sqrt{x}-2} = \boxed{4}$$

۴. $$\lim_{x\to 2} \frac{x-\sqrt{2x}}{2x^2-x-6} = \frac{\sqrt{x}(\sqrt{x}-\sqrt{2})}{(x-2)(2x+3)} = \frac{\sqrt{2}}{7\times 2\sqrt{2}} = \boxed{\frac{1}{14}}$$

$(x-2) = (\sqrt{x}-\sqrt{2})(\sqrt{x}+\sqrt{2})$

۵. $$\lim_{x\to 1} \frac{1-\sqrt{x}}{2-\sqrt{5-x}} \times \frac{2+\sqrt{5-x}}{2+\sqrt{5-x}} = \frac{(1-\sqrt{x})(2+\sqrt{5-x})}{4-5+x} = \frac{-4}{2} = \boxed{-2}$$

$x-1 = (\sqrt{x}-1)(\sqrt{x}+1)$, $(1-\sqrt{x}) \to -1$

۶. $$\lim_{x\to 4} \frac{\sqrt{3x+4}-4}{\sqrt[3]{5x+7}-3} \times \frac{\sqrt{3x+4}+4}{\sqrt{3x+4}+4} \times \frac{\sqrt[3]{(5x+7)^2}+3\sqrt[3]{5x+7}+9}{\sqrt[3]{(5x+7)^2}+3\sqrt[3]{5x+7}+9} = \frac{3x+4-16}{5x+7-27} \times \frac{27}{8}$$

$\frac{3}{5}$

$$= \boxed{\frac{81}{40}}$$

۷. $$\lim_{x\to 1} \frac{\sqrt{3x+\sqrt{x}}-2}{\sqrt[3]{x}-1} \times \frac{\sqrt[3]{x^2}+\sqrt[3]{x}+1}{\sqrt[3]{x^2}+\sqrt[3]{x}+1} \times \frac{\sqrt{3x+\sqrt{x}}+2}{\sqrt{3x+\sqrt{x}}+2} = \frac{3x+\sqrt{x}-4}{x-1} \times \frac{3}{4}$$

$$= \frac{(\sqrt{x}-1)\left(\sqrt{x}+\frac{4}{3}\right)}{(\sqrt{x}-1)(\sqrt{x}+1)} \times \frac{3}{4} = \boxed{\frac{21}{8}}$$

$$\lim_{x \to \pi} \frac{1+\cos^3 x}{\sin^2 x} = \frac{(1+\cos x)(1-\cos x+\cos^2 x)}{(1-\cos x)(1+\cos x)} = \frac{3}{2}$$ -1

$$\lim_{x \to \frac{\pi}{4}} \frac{1-\tan x}{\sin x - \cos x} = \frac{\frac{\cos x - \sin x}{\cos x}}{\sin x - \cos x} = \frac{-1}{\cos x} = -\sqrt{2}$$ -9

$$\lim_{x \to \frac{\pi}{4}} \frac{\tan^2 x - 1}{\cos^2 x} = \frac{\frac{\sin^2 x}{\cos^2 x} - \frac{\cos^2 x}{\cos^2 x}}{\cos^2 x - \sin^2 x} = \frac{-1}{\cos^2 x} = -2$$ -10