Math - Calculus II REVIEW # 7

Improper Integrals

(1) $\int_0^{\infty} e^{-x} \cos x \, dx = \frac{1}{2}$ convergent

(2) $\int_0^{\infty} \frac{dx}{(x+1)^2} = 1$ convergent ; (3) $\int_1^5 \frac{x^2+1}{\sqrt{x-1}} \, dx = \frac{472}{15}$ convergent

(4) $\int_1^2 \frac{dx}{\sqrt{x-1}} = 2$ convergent ; (5) $\int_{-2}^2 \frac{dx}{(x+2)^2} = \infty$ divergent

(6) $\int_0^1 \frac{dx}{x} = \infty$ divergent ; (7) $\int_1^{\infty} e^{-x} \, dx = e^{-1}$ convergent

(8) $\int_0^3 \frac{dx}{(x-1)^2} = \infty$ divergent ; (9) $\int_1^{\infty} \frac{dx}{(2x-1)^{3/2}} = 1$ convergent

(10) $\int_6^{\infty} \frac{dx}{x\sqrt{x^2-9}} = \frac{\pi}{18}$ convergent ; (11) $\int_0^5 \frac{dx}{x^2-4x+4} = \infty$ divergent

(12) $\int_0^1 \ln x \, dx = -1$ convergent ; (13) $\int_{-\infty}^{\infty} \frac{dx}{x^2+4} = \frac{\pi}{2}$ convergent

(14) $\int_0^{\infty} (x+1) e^{-x} \, dx = 2$ convergent

(15) $\int_1^{\infty} \frac{\arctan x}{x^2+1} \, dx = \frac{3\pi^2}{32}$ convergent

(16) $\int_0^2 \frac{2 \, dx}{(x+3)(x-2)} = \infty$ divergent ; (17) $\int_0^{\pi/2} \sec^4 x \, dx = \infty$ divergent

(18) $\int_0^{\pi/2} \csc x \, dx = \infty$ divergent

Limits

(1) $\lim_{x \to 0} \frac{x \cos 3x}{\sin 4x} = \frac{1}{4}$; (2) $\lim_{x \to 0^+} x^2 \ln x = 0$; (3) $\lim_{x \to 0^+} \frac{\sin x - x}{x \sin x} = 0$

(4) $\lim_{x\to 0} \dfrac{x^2}{1 - \cos 2x} = \dfrac{1}{2}$; (5) $\lim_{x\to 0^+} \left(\csc x - \dfrac{1}{x} \right) = 0$

(6) $\lim_{x\to +\infty} \dfrac{\ln^2 x}{x^2} = 0$; (7) $\lim_{x\to 0^+} (1 + 2x)^{\frac{3}{x}} = e^6$; (8) $\lim_{x\to \infty} x \sin \dfrac{1}{x} = 1$

(9) $\lim_{x\to -\frac{\pi}{2}} \left(\dfrac{\pi}{2} + x \right) \sec x = 1$; (10) $\lim_{x\to \infty} (1 + 8x^2)^{\frac{1}{x^2}} = 1$

(11) $\lim_{x\to \frac{\pi}{2}} \dfrac{\cot x - \cos x}{x^2} = 0$; (12) $\lim_{x\to 0} (1 + \sin x)^{\frac{1}{2x}} = e^{1/2}$

(13) $\lim_{x\to 0} \dfrac{\sin x - x \cos x}{x - \sin x} = 2$; (14) $\lim_{x\to \frac{\pi}{2}^-} \left(\dfrac{\sin x}{\cos x} + \dfrac{1}{x - \frac{\pi}{2}} \right) = 0$

(15) $\lim_{x\to 0^+} \left(\dfrac{1}{x} - \dfrac{1}{e^x - 1} \right) = \dfrac{1}{2}$; (16) $\lim_{x\to \frac{\pi}{2}^-} \cos x \ln(\cos x) = 0$