Quiz 14

Please answer the following questions in complete sentences in a clearly prepared manuscript. (No credits for the answer without nessary explaination.)

Problem 0: Quiz checklist

Please write the section number, your name and special number on the **back**.

Problem 1: Integral Test

(5 points) The series $\sum\limits_{n=1}^{\infty} \frac{4n+5}{n^2}$ converges by the integral test.
True or False? (No reason needed)

solution: False, you can see it by the comparison test with $\sum\limits_{n=1}^{\infty} \frac{4}{n}$.

(15 Points) Which of the following series converge?
You must state clearly what is $f(x)$ and calculate $\int_n^{\infty} f(x)dx$

(I) $\sum\limits_{n=1}^{\infty} \frac{1}{3n^{\frac{5}{4}}}$,
solution:
Converge.
$f(x) = \frac{1}{3x^{\frac{5}{4}}}$
$\int_1^{\infty} f(x)dx = \int_1^{\infty} \frac{1}{3x^{\frac{5}{4}}}dx = -\frac{4}{3} * x^{-\frac{1}{4}}|_1^{\infty} < \infty$

(II) $\sum\limits_{n=1}^{\infty} \frac{(\ln(n))^2}{n}$,
Diverge
$f(x) = \frac{(\ln(x))^2}{x}$
$\int_1^{\infty} f(x)dx = \int_1^{\infty} \frac{(\ln(x))^2}{x}dx = \frac{(\ln(x)^3)}{3}|_1^{\infty} = \infty$

(III) $\sum\limits_{n=1}^{\infty} \frac{2}{n+4}$,
Diverge
$f(x) = \frac{2}{x+4}$
$\int_1^{\infty} f(x)dx = \int_1^{\infty} \frac{2}{x+4}dx = 2\ln(x+4)|_1^{\infty} = \infty$