Classroom Voting Questions: Calculus II

Section 7.7/7.8 Improper Integrals

1. **True or False:** If \( f \) is continuous for all \( x \) and \( \int_0^\infty f(x) \, dx \) converges, then so does \( \int_a^\infty f(x) \, dx \) for all positive \( a \).
   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

2. **True or False:** If \( f \) is continuous for all \( x \) and \( \int_0^\infty f(x) \, dx \) diverges, then so does \( \int_a^\infty f(x) \, dx \) for all positive \( a \).
   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

3. Does \( \int_1^\infty \frac{dx}{1+x^2} \)
   (a) Converge
   (b) Diverge
   (c) Can’t tell with what we know

4. Does \( \int_1^\infty \frac{dx}{\sqrt{x^2 + x^4 + 1}} \)
   (a) Converge
   (b) Diverge
   (c) Can’t tell with what we know

5. Does \( \int_2^\infty \frac{dx}{x^2-1} \)
   (a) Converge by direct comparison with \( \int_2^\infty \frac{1}{x^2} \, dx \)
(b) Diverge by direct comparison with \( \int_{2}^{\infty} \frac{1}{x^2} \, dx \)
(c) Can’t tell by direct comparison with \( \int_{2}^{\infty} \frac{1}{x^2} \, dx \)

6. Is this an improper integral? \( \int_{1}^{\infty} \frac{\sin x}{x} \, dx \)
   (a) Yes, it is improper.
   (b) No, it is proper.

7. Is this an improper integral? \( \int_{4}^{5} \frac{1}{x} \, dx \)
   (a) Yes, it is improper.
   (b) No, it is proper.

8. Is this an improper integral? \( \int_{0}^{1} \frac{1}{2 - 3x} \, dx \)
   (a) Yes, it is improper.
   (b) No, it is proper.

9. Is this an improper integral? \( \int_{3}^{4} \frac{1}{\sin x} \, dx \)
   (a) Yes, it is improper.
   (b) No, it is proper.

10. Is this an improper integral? \( \int_{-3}^{3} x^{-1/3} \, dx \)
    (a) Yes, it is improper.
    (b) No, it is proper.
11. Is this an improper integral?
\[ \int_{1}^{2} \frac{1}{2x-1} \, dx \]
(a) Yes, it is improper.
(b) No, it is proper.

12. Is this an improper integral?
\[ \int_{1}^{2} \ln(x-1) \, dx \]
(a) Yes, it is improper.
(b) No, it is proper.