Math 1B, Quiz 3

Monday, February 9

Name:

1. (1 pt) Evaluate the integral $\int \frac{3x+2}{1+x^2}\,dx$.
2. (3 pts) Evaluate the integral $\int xe^x\,dx$.

3. (3 pts) Evaluate the integral $\int \frac{x}{\sqrt{1+x^2}}\,dx$.

4. (3 pts) Evaluate the integral $\int \frac{x^2+3x+5}{(x+1)^2}\,dx$.

5. (3 pts) How many intervals must we use (how large must n be) to guarantee that the Midpoint rule approximation to $\int_0^2 e^{x^2}\,dx$ is accurate to within 0.001 (1/1000)?

6. (2 pts) Identify all of the following integrals as convergent or divergent:

(a) $\int_1^\infty \frac{1}{x}\,dx$

(b) $\int_1^\infty \frac{1}{x^2}\,dx$

(c) $\int_1^\infty \frac{1}{\sqrt{x}}\,dx$

(d) $\int_0^1 \frac{1}{x}\,dx$

(e) $\int_0^1 \frac{1}{x^2}\,dx$

(f) $\int_0^1 \frac{1}{\sqrt{x}}\,dx$

7. (4 pts) Mark the following statements as true or false. You do not need to show your work.

(a) $\int_1^\infty \frac{\sin^2 x}{x^3}\,dx$ converges by comparison with $\int_1^\infty \frac{1}{x^3}\,dx$.

(b) $\int_1^\infty \frac{\sin x}{x}\,dx$ diverges by comparison with $\int_1^\infty \frac{1}{x}\,dx$.

(c) $\int_0^1 \frac{\ln(1+x)}{x}\,dx$ diverges by comparison with $\int_0^1 \frac{1}{x}\,dx$.

(d) $\int_0^\infty \frac{1}{(x-1)^2}\,dx$ is a divergent improper integral.

Extra Credit

Mark all statements as true or false (0.1 pt each). Answers will be judged based on their consistency with your other answers rather than according to a theoretical "correct" solution.

1. At least three of these statements are true.
2. At least three of these statements are false.
3. Statements 1 and 2 have the same answer.
4. This statement and statement 5 have different answers.
5. Exactly one of these statements is true.