Question 1: (Integration by Parts) Determine $\int \frac{\ln(x)}{\sqrt{x}}\,dx$

[5]

Question 2: (Integration by Parts) Determine $\int_0^1 \cos^{-1}(x)\,dx$

[5]

Question 3: (Trigonometric Substitution) Determine $\int \frac{1}{x^2\sqrt{16-x^2}}\,dx$

[10]

Question 4: (Partial Fractions) Determine $\int \frac{x-4}{x^2-5x+6}\,dx$

[5]

Question 5: Determine $\int \frac{4x^2+4x-1}{4x^2-4x+3}\,dx$

[5]

Question 6: Use T_4, the Trapezoid Rule on four subintervals to approximate $\int_1^5 \frac{\cos(\pi x)}{x}\,dx$. Express your final answer as a single simplified fraction.

[5]

Question 7: Determine whether $\int_0^\infty x^2 e^{-x^3}\,dx$ converges or diverges. If it converges give the value, if it diverges then say so. Make proper use of any required limits and use proper notation.

[5]

Question 8: Determine if the improper integral $\int_0^5 \frac{x}{x-2}\,dx$ converges or diverges. If it converges give the value, if it diverges then say so. Make proper use of any required limits and use proper notation.

[5]

Question 9: Determine the area of the region in the first quadrant that is bounded by the curves $y = 1/x$, $y = x$ and $y = x^2/8$.

[5]