MATH 116-009 QUIZ 4 / 6 Oct 2006 Name:______________________________

Possibly useful: $\int_1^\infty \frac{1}{x^p}\,dx$ *converges for* $p > 1$ *and diverges for* $p \le 1$. $\int_0^1 \frac{1}{x^p}\,dx$ *converges for* $p < 1$ *and diverges for* $p \ge 1$*, and* $\int_0^\infty e^{-ax}\,dx$ *converges for* $a > 0$.

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1. Find the area under the curve $y = x^2 e^{-x^3}$ for $x \ge 3$. (3 points)

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2. Carefully determine whether each of the following converge

(a) $\int_0^1 \frac{5x}{\sqrt{x^3+x^4}}\,dx$ (b) $\int_1^\infty \frac{1}{\sqrt{x^3-x}}\,dx$

(4 points)

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3. Consider the four functions shown in the graph to the right. (In order from top to bottom at the right side of the graph they are $f(x)$, $g(x)$, $h(x)$ and $k(x)$.) Assume that the relative behaviors shown for these four functions continues for $x > 3$. $f(x) = \frac{1}{x}$ and $h(x) = \frac{1}{x^2}$. Which of the four integrals $\int_{0.5}^\infty f(x)\,dx$, $\int_{0.5}^\infty g(x)\,dx$, $\int_{0.5}^\infty h(x)\,dx$, and $\int_{0.5}^\infty k(x)\,dx$ converge? Which diverge? Are there any for which you cannot tell? Explain briefly (no calculations are necessary). (3 points)