Instructions: Choose EXACTLY 10 points to be graded. I will evaluate anything you turn in but you MUST indicate which 10 points you want to count towards your grade. You will not earn full credit if your choice is not clear even if all of your solutions are correct. You are free to ask me any questions and work with whomever you like. If you work with any one else or use any resources beyond the textbook and class notes, please let me know. *Quiz 3 in D2L.*

1. Evaluate any of the following integrals:

   (a) (1 point) $\displaystyle\int x^2 5^x \, dx$

   (b) (1 point) $\displaystyle\int \frac{\sqrt{2x^2+18}}{x^4} \, dx$

   (c) (1 point) $\displaystyle\int \arcsin(x) \, dx$

   (d) (1 point) $\displaystyle\int \frac{r^2}{r+4} \, dr$

   (e) (2 points) $\displaystyle\int_0^{\pi} e^{\cos(t)} \sin(2t) \, dt$

   (f) (1 point) $\displaystyle\int_0^1 \frac{x-4}{x^2-5x+6} \, dx$

   (g) (1 point) $\displaystyle\int \theta \sec(\theta)\tan(\theta) \, d\theta$

   (h) (1 point) $\displaystyle\int \frac{x^2-x+6}{x^3+3x} \, dx$

   (i) (1 point) $\displaystyle\int \big(\tan(x)\big)^5 \big(\sec(x)\big)^4 \, dx$

   (j) (1 point) $\displaystyle\int_0^{3/5} \sqrt{9-25x^2} \, dx$

2. (3 points) Consider the integral $\displaystyle\int_0^3 \left(\frac{1}{2}\right)^x \, dx$.

   (a) Use either the midpoint or trapezoidal rule to estimate with $n = 6$.

   (b) What is the bound on the error for your estimate?

   (c) How large would we need to choose n to be to guarantee that the error for whichever rule you chose is less than 0.01?

3. For any of the following, determine if the integrals converge or diverge:

   (a) (1 point) $\displaystyle\int_0^{\frac{\pi}{2}} \tan(x)\,dx$

   (b) (1 point) $\displaystyle\int_0^{\infty} ye^{-y}\,dy$

   (c) (1 point) $\displaystyle\int_5^{\infty} \frac{2x}{\sqrt[5]{x^7+x^2+x+1}}\,dx$

   (d) (1 point) $\displaystyle\int_0^{1} \ln(x)\,dx$

   (e) (1 point) $\displaystyle\int_1^{\infty} \frac{1}{2+\sin(x)+e^{x^2}}\,dx$

   (f) (1 point) $\displaystyle\int_{-\infty}^{\infty} \frac{e^x}{1+e^{2x}}\,dx$

   (g) (1 point) $\displaystyle\int_0^{\infty} \sin\left(\frac{x}{2}\right)\,dx$

4. Consider the region R bounded by $f(x)=\sin(x)$ and the x-axis on $[0,\pi]$.

   (a) (2 points) Find the volume of the solid created by rotating the region R about the x-axis.

   (b) (2 points) Find the volume of the solid created by rotating the region R about the y-axis.

5. (2 points) Consider a 3-dimensional solid S whose base is the triangular region with vertices $(0,0)$, $(2,0)$, and $(0,1)$ and the cross-section perpendicular to the x-axis are squares. Find the volume of S.

6. (4 points) Consider the region A bounded by $x=y^3-y-1$ and the $x=-y^2$. Set up (but do not evaluate) an integral that calculates the volume generated by rotating the region about the following lines:

   (a) $x=2$

   (b) $x=-3$

   (c) $y=1$

   (d) $y=2$

7. (2 points) Consider a 3-dimensional solid T whose base is the region bounded by $y=0$, $x=0$, and $y=3-x$ and whose cross-sections perpendicular to the x-axis are half discs. Find the volume of T.