EXAM 2 # TMath 125 Spring 2014

1. [3] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F.

   T F $\dfrac{1}{a+b} = \dfrac{1}{a} + \dfrac{1}{b}$ for real, non zero numbers a and b.

   T F If g is continuous and $\displaystyle\int_{-3}^{7} \frac{1}{2} g(x)\,dx = 4$, we can not evaluate $\displaystyle\int_{0}^{5} g(2x-3)\,dx$.

   T F Calculus 2 & precalculus methods can integrate any rational function.

Show your work for the following problems. The correct answer with no supporting work will receive NO credit.

2. [4] Choose *ONE* of the following. Clearly identify which of the two you are answering and what work you want to be considered for credit.

   (a) (Word Wks #2) If you are given the graph of a force as a function with respect to distance below, explain to someone who only took the first quarter of Calculus how to graph the total work as a function of distance.

   (b) (Word Wks #4) Explain the Mean Value Theorem for Integrals to someone who only took the first quarter of Calculus.

3. [12] For each of the following outline the method(s) you would use to find the general antiderivative. Include in the descriptions which substitutions you would make and the fall out that would occur. Essentially, give the same level of detail as was given on the practice exam key.

[3] (sorry-no meta-data for these)
$$\int \cos^3(\theta)\sin^3(\theta)\,d\theta$$

[3] (sorry-no meta-data for these)
$$\int \frac{2x^3+2x+1}{x^2+1}\,dx$$

[3] (sorry-no meta-data for these)
$$\int \frac{t^3}{\sqrt{t^2+49}}\,dt$$

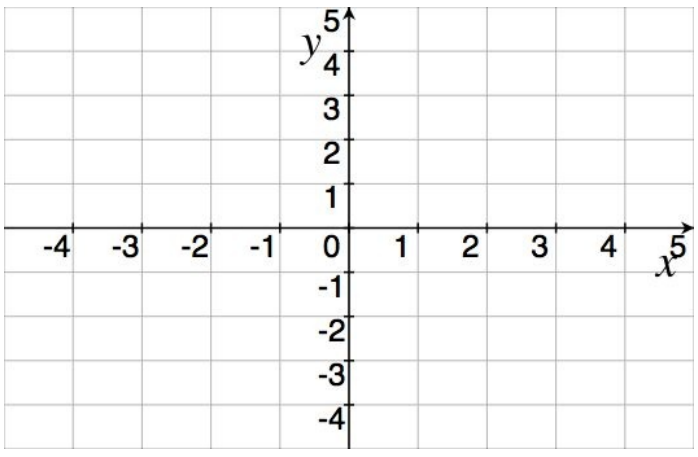
[3] (sorry-no meta-data for these)
$$\int \frac{\ln y}{\sqrt{y}}\,dv$$

4. [4] Identify one integral from the previous page and find the general antiderivative.

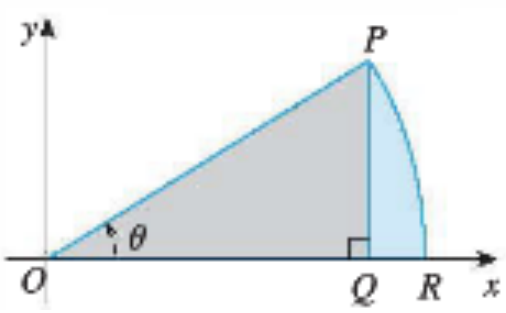
5. [5] (§7.1 #63) Consider the region under the curve $y = e^{-x}x$, above $y = 0$, and from $-1 \leq x \leq 0$.

   (a) [1] Carefully draw the region described.

   (b) [4] Set up the integral (but do *not* integrate) that is used to find the volume of the solid resulting from rotating the above region about the line $x = 1$.



6. [7] Choose *ONE* of the following.
Clearly identify which of the two you are answering and what work you want to be considered for credit.



(a) (Word Wks #1) Prove the formula $A = \frac{1}{2}r^2\theta$ for the area of a sector of a circle with radius r and central angle θ (pictured to the right).

(b) A particle is moving along in a straight line and has the velocity of $v(t) = \dfrac{x^3+4}{x^2+4}$ at time t.
(pictured to the right)
Find a function that describes the net change in position at time t.