Math 152
Final Exam
March 20th, 2009

Name: _____

1. Your exam contains 8 questions and 6 pages. Please make sure you have a complete exam.
2. The entire exam is worth 100 points. Point values vary and these are indicated on each problem. You have 2 hours for this exam.
3. Make sure to **ALWAYS SHOW YOUR WORK**; you will not receive any partial credit unless all work is clearly shown. If in doubt, ask for clarification.
4. If you need extra space, use an extra sheet stapled to the back of the exam and clearly indicate this.
5. You are allowed **two** 8.5×11 sheets of handwritten notes (both sides) and a calculator.
6. Leave **answers in exact form** (as **simplified** as possible).
7. Put a box around your final answer where applicable.

Problem	Total Points	Score
1	13	
2	10	
3	14	
4	13	
5	14	
6	9	
7	13	
8	14	
Total	100	

1. (13 pts.) Find the exact area under the curve $f(x) = 3\sin(\sqrt{x})$ from $x = 0$ to $x = 8$.

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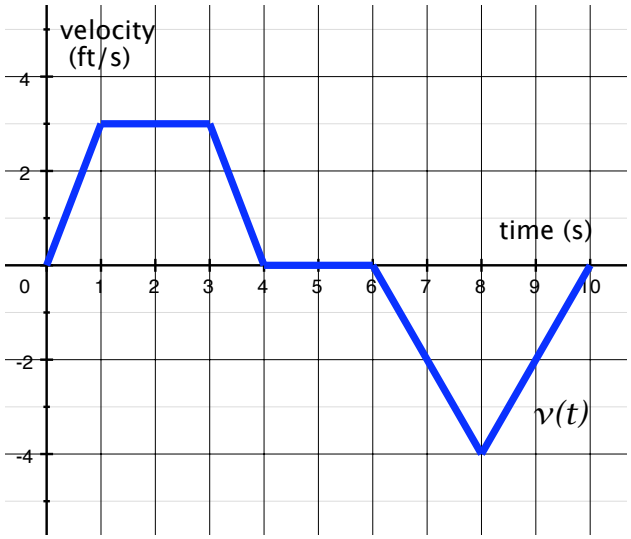
2. (10 pts.) The velocity function $v(t)$ of a nice platypus as it walks along a straight path is given in the graph below.



(a) (3 pts.) What does $\int_0^{10} v(t)\,dt$ represent and what are the units?

#2 Continued on Next Page

#2 Continued:

(b) (4 pts.) Find the exact value of $\int_0^{10} v(t)\,dt$.

(c) (3 pts.) **When** is the platypus the furthest away from its starting position and **how far** is it at that time?

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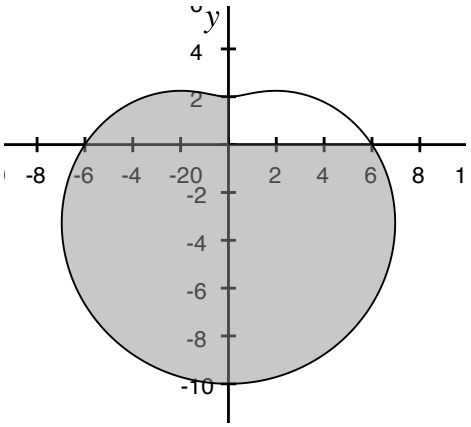
3. (14 pts.) Evaluate the integral $\int_4^{\infty} \frac{10}{x^2 - x - 6}\,dx$. State whether it is convergent or divergent.
(Hint: $\ln(\frac{a}{b}) = \ln(a) - \ln(b)$)

4. (13 pts.) Find the area of the shaded region shown below for the given **polar curve**.



$$r = 6 - 4\sin(\theta)$$

5. (14 pts.) Let R = the region bounded by the curve $y = \sqrt{x-2}$ and the x-axis from $2 \leq x \leq 6$.

Find the volume of the solid obtained by revolving R about the line $y = -3$.

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6. (9 pts.) Given that $\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$, find the value of the following sums:

(a) (5 pts.) $\sum_{i=1}^{200} i$

(b) (4 pts.) $\sum_{i=5}^{200} i$

More problems on back →

7. (13 pts.) Evaluate the integral $\displaystyle\int \frac{2\ dx}{(\arcsin x)^3 \cdot \sqrt{1-x^2}}$

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8. (14 pts.) Solve the differential equation $\dfrac{dy}{dx} = \dfrac{\tan^2(x)\sec^4(x)}{e^{5y}}$ with the initial condition $x = 0$, $y = 1$.