MATH 2250 Name _____
Practice Exam # 4

Important things:

- Remember, you must show your work to receive credit. Your work must be **neat**. If I can't read it (or can't find it), I can't grade it.
- You don't have to work through the test in order. Go in the order you want to.
- You are allowed to use a TI-30 calculator as long as it is NOT a TI-30X Pro. No other calculators are permitted, and sharing of calculators is not permitted.
- I hope you do a great job!

Problem	Score	Out of
1		8
2		16
3		22
4		10
5		18
6		14
7		12
Total		100

I will be academically honest in all my academic work and will not tolerate academic dishonesty of others.

Signed: _____ Date: _____

1. (8 points) Solve the initial value problem
$y' = \dfrac{1}{x} - \dfrac{1}{1+x^2}, \qquad y(1) = \pi/2.$

2. Determine the following indefinite integrals.

   (a) (4 points) $\displaystyle\int \csc(x)\cot(x)\ dx$

   (b) (6 points) $\displaystyle\int e^{x^4+1}x^3\ dx$

   (c) (6 points) $\displaystyle\int (3\sin(x))^2\cos(x)\ dx$

3. Determine the following definite integrals.

(a) (4 points) $\int_0^1 \left(e^{3x} + 7\right)\ dx$

(b) (4 points) $\int_1^8 \left(\frac{7}{\sqrt[3]{x^4}} - \frac{8}{x^3}\right)\ dx$

(c) (7 points) $\int_e^{e^2} \left(\frac{\sin(\ln(x))}{x}\right)\ dx$

(d) (7 points) $\int_{\pi/4}^{\pi/3} \frac{\cos(x) + \sec^2(x)}{\sin(x) + \tan(x)}\ dx$

4. (a) (5 points) Evaluate the definite integral $\int_{-3}^{3} \sqrt{9 - x^2}\, dx$.

(b) (5 points) Determine the area under the curve $y = |2x - 4|$ from $x = 0$ to $x = 5$.

5. (3 points each part) Determine whether the following apply to "all," "some" or "none" of the continuous functions f on the interval $[a, b]$. (Circle your answer.)

(a) The integral $\int_a^b f(x)\,dx$ represents the area below the curve $y = f(x)$.

all some none

(b) The integral $\int_a^b f(x)\,dx$ can be represented by a limit of Riemann sums.

all some none

(c) The integral $\int_a^b f(x)\,dx$ can be evaluated using basic geometry formulas.

all some none

(d) The integral $\int_a^b f(x)\,dx$ represents the net change of f on the interval $[a, b]$.

all some none

(e) The Fundamental Theorem of Calculus Part 1 applies to the integral $\int_a^b f(x)\,dx$.

all some none

(f) The Fundamental Theorem of Calculus Part 2 applies to the integral $\int_a^b f(x)\,dx$.

all some none

6. For this problem, use the function $f(x) = x^2 + 5$.

   (a) (10 points) Determine a Riemann sum S_n for $f(x)$ on the interval $[1, 3]$ using right endpoints and n subintervals of equal width. Simplify your answer as much as possible.

   (b) (4 points) Use S_n to determine $\int_1^3 f(x)\, dx$. (Note: I must be able to see how you are thinking about S_n; show all work.)

7. (a) (4 points) Determine $\dfrac{d}{dx}\left(\displaystyle\int_0^x e^{-t^2}\ dt\right)$.

(b) (4 points) Determine $\dfrac{d}{dx}\left(\displaystyle\int_1^7 \frac{1}{t}\ dt\right)$.

(c) (4 points) Determine $\dfrac{d}{dx}\left(\displaystyle\int_0^{\cos(x)} \arctan(t)\ dt\right)$.

Extra space for work. If you want me to read/grade the work on this page you should write me a note on the corresponding question's page.